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# **Rational Investing with Ratios**

## Implementing Ratios with Enterprise Value and Behavioral Finance

**Yannick Coulon**

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# Preface

## Why Do You Need This Book?

This book adds value to any discussion on the importance and implementation of ratios.

A financial ratio establishes a proportional relationship between accounting and market data. If a ratio is isolated and applied incorrectly, it is seen as a number without great significance. However, when well integrated into a global company vision, ratios become powerful indicators that can outline relevant information and identify warning signs. Ratios help us better understand business ventures, especially their strengths and weaknesses.

The purpose of this book goes beyond merely listing possible ratios; it aims to explain the concept and logic behind each key ratio. Didactics is key to this project, and each ratio family is illustrated with numerous graphs and practical cases. This information is therefore particularly useful for bankers, entrepreneurs, investors, managers, and obviously, students.

Ratios are applicable worldwide, and the book is not US or Europe centric; readers can come from international contexts and backgrounds.

## Ratio Quality and Limitations

Ratios help establish the financial diagnosis of a company, but they are limited by the quality and availability of key information. In other words, ratios will not turn lead into gold! As a result, the book puts emphasis on ratios incorporating market data, whenever they are available and reliable.

## Accuracy or Trend

The absolute level and precision of a ratio is interesting. However, the trend observed is the most reliable and fundamental piece of information, as it demonstrates whether a situation is deteriorating, stabilizing or improving.

# **Comparisons Have Limitations**

A comparison is not always appropriate but in the practice of finance, it is a fundamental step if well applied. It helps users to detect deviations from the past or deviations from competing companies within the same sector.

## **Ratios Are a Beginning, Not an End Unto Themselves**

A financial diagnosis is only one aspect of a global company analysis. Its strategic positioning, competitive advantages, corporate sustainability and human capital add value to the financial vision.

## **Ratios Are Numerous**

The list of ratios mentioned in the book is not exhaustive or academic. The inclusion of countless ratios does not allow for a concise and coherent financial analysis, and therefore the book retains the ones that are considered relevant, essential and complementary.

## **Ratios for Family Businesses and Corporations**

Many simple and more challenging educational cases are used for illustrating each ratio family. The ratios will differ depending on the given context, such as a family business or a listed company. These complementary visions are outlined.

## **Enterprise Value (EV)**

Much attention is given to the concept of enterprise value, and the reader will find a detailed description of enterprise value in the first section. Numerous ratios illustrate the importance of this reference value for debt, economic performance and valuation. The concepts of capital employed, non-core assets or surplus cash are also addressed, given that they play a key role in EV calculation. Very few current textbooks treat these metrics

in such great detail.

## A Touch of Behavioral Finance

Ratios become useless if the financial decision is emotional or irrational, and thus this book addresses a few aspects of behavioral finance. The principles of an investment thesis are outlined.

## The Narrative Thread

The book starts with a short review of financial statements and cash flows (see Sects. 1.1 and 1.2 ). However, the goal is not to lecture on accounting principles, as there are already numerous books of high-quality that cover this topic on the market.

The emphasis is then placed on operating assets , capital employed and enterprise value (see Sect. 1.3 ). These are essential metrics that will be extensively used in Chaps. 5 and 6 .

The core of this book is found in Chaps. 2 , 3 , 4 , and 5 , which deal with ratios in the following order:

- Efficiency, liquidity and solvency ratios are outlined first since poor cash management will be rapidly fatal for a company (see Chaps. 2 and 3 ).
- Debt and profitability ratios follow suit in Chaps. 4 and 5 with a clear divide between non-listed (i.e., accounting ratios) and listed companies (i.e., market-related ratios).
- Chapter 6 brings the full set of ratios into perspective with two case studies: One case deals with a small private company, and the other deals with three giant retail companies, namely Alibaba, Amazon and Walmart.

Chapter 7 starts with a discussion on the benefits of using an investment thesis . This disciplined and rational approach can be an efficient tool to combat behavioral biases. Possible investment theses for Alibaba, Amazon and Walmart are presented thereafter. The key behavioral biases are then introduced and conclude the chapter.

Some of the contents are straightforward, while some are more complex and concise. In any case, the book aims to be informative, practical and clear, rather than to pursue an academic dimension. The book concentrates on the essential, and it strives to make complex equations understandable.

*Please enjoy the book, and do not hesitate to send feedback.*

**Yannick Coulon**  
**Brest, Brittany, France**

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# 1. Presentation of Key Financial Metrics and Enterprise Value

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## Abstract

The first chapter outlines the essential metrics used in financial ratios. The core of the chapter focuses on operating assets, capital employed and mostly on **enterprise value** (EV). EV is an essential metric that will be extensively used in profitability ratios. Several short case studies and illustrations are included. Key takeaways on metrics and their limitations conclude the chapter.

**Keywords** Operating assets Capital employed Enterprise value Core and non-core assets Excess or surplus cash

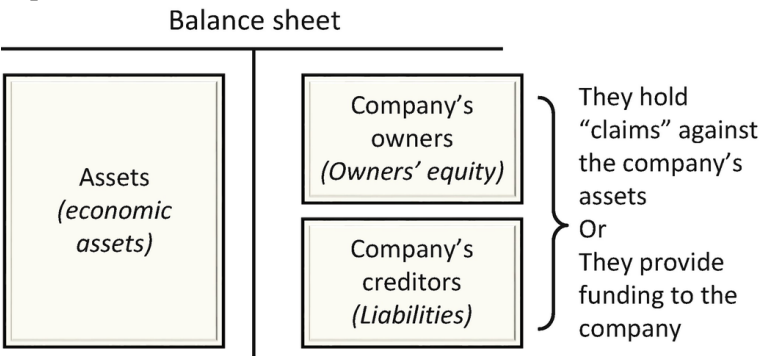
## 1.1 The Balance Sheet, Income and Cash Flow Statements

Financial statements provide essential accounting data extensively used in

ratio analysis. We therefore start with a short summary highlighting the key features of the three financial statements, namely the balance sheet, the income statement and the cash flow statement.

### 1.1.1 "The Balance Sheet

The **balance sheet** is a snapshot of a firm's wealth at the end of an accounting period (year or quarter). Figure 1.1 shows how a balance sheet is conceptualized.



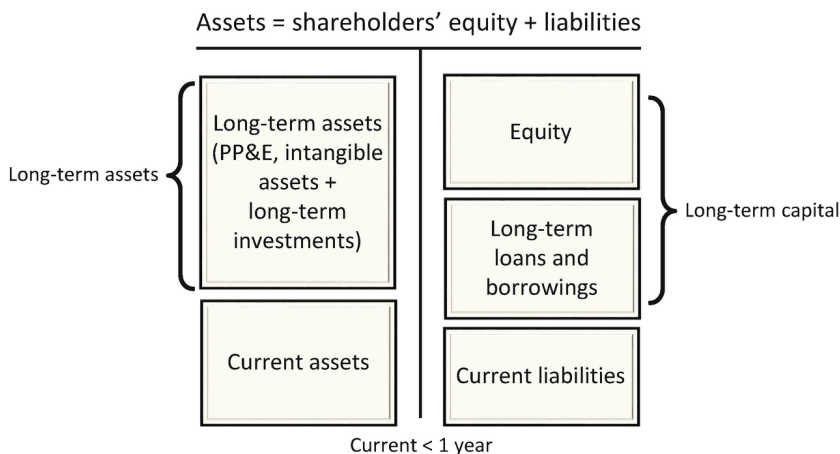
- 1) First conceptual presentation of a balance sheet  
*Assets = economic assets = claims*
- 2) Second conceptual presentation of a balance sheet  
*Uses of funds = sources of funds*

**Fig. 1.1**Two conceptual presentations of a balance sheet

“Book value” is the valuation method used in most balance sheets. The net asset price is the historical cost of an asset minus its accumulated depreciation or amortization (i.e., net book value).

Market value is not often used in balance sheets for two main reasons:

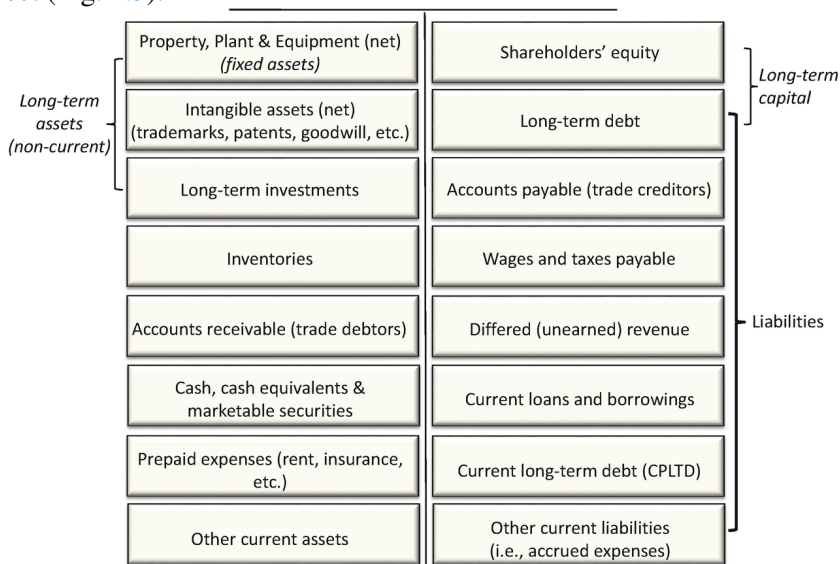
- In many countries, an upward asset price adjustment is viewed as a taxable gain.
- In a non-efficient financial market, a market value is not always fair and very often volatile (even unknown for most private non-listed companies). A book value, with all its drawbacks, is stable. The balance sheet can be aggregated as illustrated in Fig. 1.2.



Explaining a balance sheet equilibrium with accounting terminology

**Fig. 1.2**Main building blocks of a balance sheet

The following graphic shows a more detailed presentation of a balance sheet (Fig. 1.3).



Total «financial or interest bearing» debt = long-term debt such as bank loans, bonds, lease obligations, notes...  
+ current borrowings such as commercial paper, overdraft facilities, short-term credit

**Fig. 1.3**Main balance sheet line items

## Liability Versus Debt, Definition and

# Scope

In a broad sense, a debt is equivalent to a liability. It refers to an obligation toward a creditor, whether a supplier, a government, an employee or a financial institution.

A debt can also be strictly understood as a financial or interest-bearing obligation such as a bank loan, bond, note, line of credit or overdraft.

To avoid any confusion, we will use the term “financial debt” (interest-bearing debt) in its specific context and “liabilities” in a more inclusive and broader sense (any obligation needed to be repaid or delivered/served).

As an example, accounts payable are not included in our definition of “financial debt” as they rarely bear any interest and are more commercial than financial.

We will differentiate current financial debt (a loan with a maturity of less than one year) from the current portion of long-term debt. The former is regrouped under the general heading “short-term financial debt,” the latter under “CPLTD.”

Figure 1.4 provides a detailed view of current assets and liabilities.

Current assets	Current liabilities
Inventories	Accounts payable (trade creditors)
Accounts receivable (trade debtors)	Wages and taxes payable (accrued liabilities)
Prepaid expenses	Deferred / unearned revenue
Cash & cash equivalents	Current loans/ borrowings
	Current portion of long-term debt
	Short-term financial debt (interest bearing)

Fig. 1.4Main current assets and liabilities

The book adopts the two-sided/column European format, which firstly lists fixed assets (from fixed to liquid) and equity (from long-term to short-term). Format used has no impact on ratio calculation or interpretation.

## 1.1.2 The Income Statement

The income statement keeps track of the business activity of a company (i.e., sales revenue and expenses) generated during one specific accounting period (year or quarter) and indicates how net income or profit is reached and calculated (Fig. 1.5).

## Income Statement

### Sales revenue

- Cost of goods sold (COGS)
- R&D, selling, general, administrative and other expenses

### = EBITDA

- Depreciation
- Amortization

### = EBIT (Earnings before interest & taxes)

- Interest expense

### = EBT (Earnings before taxes)

- Income taxes

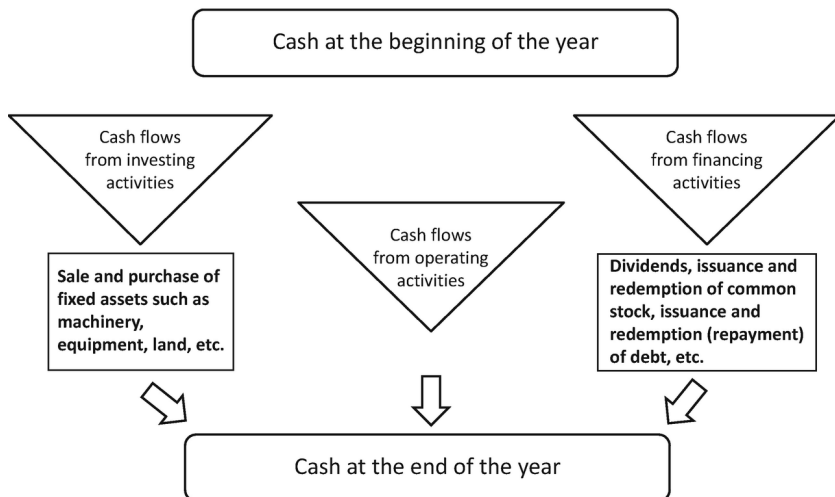
### = Net income

**Fig. 1.5** Simplified income statement and main line items

A standard income statement does not show EBITDA, it has to be calculated by simply adding depreciation and amortization expenses to operating income or profit (Earnings before Interest and Taxes or EBIT). This simplified format is used throughout the book.

## 1.1.3 The Cash Flow Statement

The cash flow statement keeps track of the cash flows generated by a company during an accounting period (year or quarter). It classifies the cash flows into three major categories as illustrated in Fig. 1.6.



**Fig. 1.6**Statement of cash flows

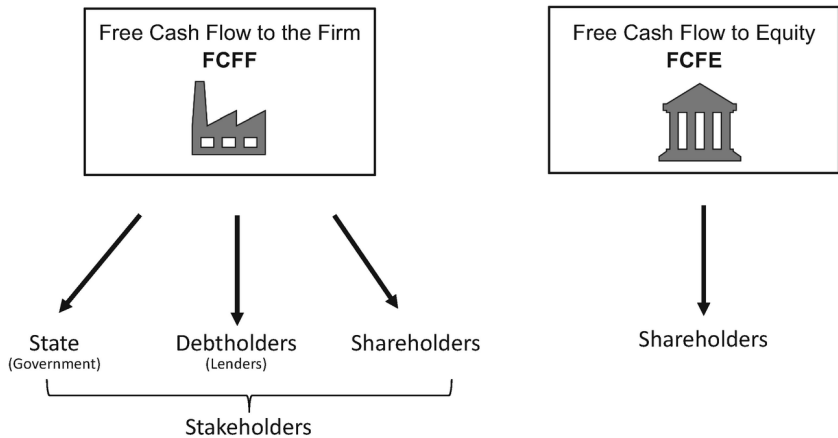
## 1.2 The Cash Flows

Cash flows are the essence of a business, they reflect the actual cash the company generates today in contrast to historical metrics derived from the balance sheet, as such data are not always reliable. Incorporating them in ratios adds robustness, accuracy and credibility.

### 1.2.1 *FCFF and FCFE*

The two main cash flows used in company valuation are the free cash flow to the firm (FCFF ) and the free cash flow to equity (FCFE ) (Fig. 1.7).

## Stakeholders of the two free cash flows



**Fig. 1.7** Main beneficiaries of the free cash flows

We now focus on the two definitions and formulas of FCFF and FCFE as illustrated in Fig. 1.8.

### Free Cash Flow to Equity (FCFE)

$$\text{FCFE} = \text{EBITDA} - \text{tax rate} \times (\text{EBITDA} - \text{dep \& amort}) - \text{int rate} \times (1 - \text{tax rate}) - \text{net Investments in non-cash working capital} - \text{net Investments (CAPEX)} + \text{net Borrowings}$$

*FCFE is the cash flow available to the firm's stockholders once the firm has paid for all operating, interest and tax expenses and paid for investments needed to maintain the firm's operating assets (CAPEX + growth in NCWC). Debt holders make a positive or negative cash contribution depending on net borrowings.*

*Net borrowings = new debt (new borrowing) – debt repayment (capital reimbursement)*

### Free Cash Flow to the Firm (FCFF)

$$\text{FCFF} = \text{EBITDA} - \text{tax rate} \times (\text{EBITDA} - \text{dep \& amort}) - \text{Investments in non-cash working capital} - \text{net Investments (CAPEX)}$$

*FCFF is the cash flow available to all the firm's suppliers of capital (stakeholders) once the firm has paid all operating and tax expenses and paid for investments needed to maintain the firm's operating assets (CAPEX + growth in NCWC).*

*Growth in NCWC = investment or net change in non-cash working capital (from operations)*

**Fig. 1.8** FCFE and FCFF starting from EBITDA

When little accounting information is available, a rough (but often reliable) estimate of the cash flow generated by a company can be calculated as follows:





$$\text{Cash flow} = \text{net income} + \text{depreciation and amortization}$$

Depreciation and amortization are the largest common non-cash expenses. Provisions can also be substantial non-cash items.

## 1.2.2 EBITDA

Earnings before interest, taxes, depreciation and amortization (EBITDA) is a good proxy for measuring the cash flows generated by the company's operations.

*Here is a basic equation for EBITDA:*

$$\text{EBITDA} = \text{EBIT (operating profit or income)} + \text{depreciation} + \text{amortization}$$

Depreciation and amortization are very similar in nature, but amortization is applied to intangible assets such as patents while depreciation is applied to tangible assets like machines and inventory (PP&E), according to US terminology.

- Depreciation = tangible assets (PP&E or property, plant and equipment)
- Amortization = intangible assets

EBITDA is the starting point for numerous financial analyses, but it has its limitations. For example, it does not consider the level of existing debt and capital expenditure (capex) required.

A company needs to reinvest year after year in capital expenditure in order to maintain its level of EBITDA. Therefore, EBITDA must be linked to the level of investment needed for its maintenance and expansion.

## 1.2.3 Recurring Cash Flows

Recurring cash flows should be the only relevant cash flows used in ratios and methods of company valuation. Exceptional items should be excluded.

## Company Comparison: Bogey or Eagle?

Figure 1.9 presents the simplified income statements for two comparable companies.

Company Bogey		Company Eagle	
EBIT	+100	EBIT	+90
Interest expenses	−30	Interest expenses	−10
Extraordinary items	+50	Extraordinary items	−40
	<hr/>		<hr/>
<b>Net income before tax</b>	<b>+120</b>	<b>Net income before tax</b>	<b>+40</b>

Note: extraordinary = non-recurring

**Fig. 1.9** Company Bogey versus company Eagle

According to the above income statements, company Bogey has strongly outperformed company Eagle (3× larger net income before tax).

Company Bogey carries a higher financial leverage (higher interest expenses) and therefore a higher risk than company Eagle. Moreover, company Bogey has a large extraordinary item which is unlikely to reoccur in the future. Company Eagle has a stronger recurring income of 80 (i.e.,  $90 - 10$ ) compared to 70 (i.e.,  $100 - 30$ ) for company Bogey.

In conclusion, company Eagle seems to be the best-risk adjusted investment according to the limited information available. It carries less financial risk and generates more recurring income than company Bogey, despite the excellent and perhaps an abnormal performance of company Bogey during that specific year.

## 1.3 Enterprise Value (EV)

Enterprise value (EV) is the market value of core operating assets. EV (or total firm value) is also the market value of capital employed.

It seems therefore logical to focus first on the definitions of operating assets and consequently capital employed.

Since essential ratios such as the return on capital employed (ROCE) or EV multiples use EBIT (**operating** income) or EBITDA (**operating** income + depreciation and amortization (D&A)) as a metric, our definition of **operating** assets and capital employed becomes of paramount importance and allows for consistency throughout the book.

### 1.3.1 Capital Employed and Operating

# Assets

*Capital employed* is the total amount of capital that has been invested in a company for generating its core operating profit.

By construction, this amount is equivalent to the sum of all core operating assets of the company (Fig. 1.10).

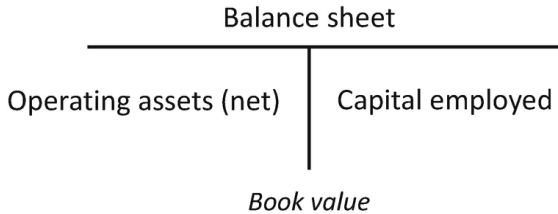


Fig. 1.10Capital employed and net operating assets

Capital employed is a widely used concept with different and sometimes conflicting classifications. Two definitions are presented here; the first one is based on the simple method (i.e., broad definition of working capital), and the second is based on the method using operating and non-core assets (Fig. 1.11).

Balance sheet		Balance sheet <small>with operating and non-core assets</small>	
Long-term assets	Equity	Long-term operating assets	Equity
Current assets (incl. cash)	Debt (long-term)	Non-cash current operating assets	Debt (interest bearing)
	Current liabilities	Operating cash	Current operating liabilities
		Non-core assets (incl. excess/surplus cash)	

→ Simple method with “broad” working capital

→ Method using operating and non-core assets

Capital employed = equity + long-term debt	Capital employed = equity + interest bearing debt + non-core assets (incl. excess cash and other non-core assets)
Capital employed = long-term assets + working capital (incl. cash)	Net operating assets = long-term operating assets + non-cash current operating assets + operating cash - current operating liabilities
Capital employed = long-term assets + current assets (incl. cash) - current liabilities	
Capital employed = total assets - current liabilities	Net operating assets = capital employed

*Operating cash = cash needed for day-to-day business operations & transactions*

Fig. 1.11Two versions of capital employed

## 1.3.2 Examples of Capital Employed

# Calculations

See the following example showing the calculation of capital employed for a small European company named SGVSL with a low level of cash.

SGVSL’s balance sheet appears as follows (Table 1.1):

Table 1.1 Company SGVSL’s balance sheet

Balance sheet SGVSL in €	Year X	
Fixed assets (net)		
250,000		
40,000 term bank loans		
5,000 from shareholders		
10,000 provisions		
10,000 trade receivables		
10,000 trade payables		
50,000 term bank loans		
250,000 equity + liabilities		

## The Treatment of Cash and Cash Equivalents Can Be Complex!

With the simple method, a broad definition of working capital is implemented, and cash is defined as operating cash only. The non-core assets method is subtler as it sometimes considers overall cash as excess cash, meaning cash being deducted from debt (i.e., net debt). In theory, cash may also be split into operating cash and excess cash.

Simple method with the broad working capital definition

The broad definition of working capital is implemented.

Net operating assets method (operating cash only)

Cash is at a low level and can be considered as operating cash only; non-cash working capital from operations (NCWC ) is used instead of working capital

## Conclusions: SGVSL’s Capital Employed

Both methods result in approximately the same amount of capital employed, namely 255,000 € versus 260,000 €.

Having 40,000 € in cash seems to be a perfect match for day-to-day

transactions, and it does not appear to be excess cash. Thus, both methods may be applied. In other words, debt cannot be artificially reduced by 40,000 €, and without these 40,000 € in cash, the company simply cannot run its operations smoothly.

If the amount of cash were greater, the two methods would result in significantly different amounts for capital employed.

*The following example of company “SGVSL Excess” shows the calculation of capital employed with high cash holdings.*

SGVSL Excess’s balance sheet is as follows (Table 1.2):

**Table 1.2**Company SGVSL Excess’s balance sheet

Balance sheet SGVSL Excess, in €	Year X	
260,000 (net)		
80,000 term bank loans		
150,000 from shareholders		
10,000 prepaid expenses		
100,000 short-term securities payable		
50,000 term bank loans		
150,000 equity + liabilities		

*Simple method with broad working capital definition*

*Net operating assets method (excess cash only)*

All cash is considered as excess cash, NCWC is used

*Net operating assets method (mixed cash)*

Cash is split between operating and non-operating cash, and NCWC is used

Overall cash = cash + cash equivalents = 140,000 = 40,000 (operating) + 100,000 (excess)

The shareholders have invested 100,000 € in short-term marketable securities.

Net operating assets = long-term operating assets + operating cash + non-cash working capital from operations  
= 180,000 + 40,000 + 40,000 + 45,000 + 10,000 – 35,000 – 20,000  
= **260,000 €**

Capital employed = equity + interest-bearing debt – excess cash  
= 150,000 + 80,000 + 125,000 + 5000 – 100,000 = **260,000 €**

# ***Conclusions: SGVSL and SGVSL Excess's Capital Employed***

Between SGVSL and SGVSL Excess, the only differences are marketable securities and loans from shareholders. However, operating assets are still the same, and thus the measurement of capital employed should logically remain the same at 260,000 €.

The most demanding and complete method is clearly to split the cash into operating and non-operating cash whenever possible, even when determining the amount of operating cash can get tricky. The method of considering cash as excess cash only is also acceptable. When the amount of cash appears to be relatively high, we should avoid the method of using the broad definition of working capital because it distorts the capital employed amount (i.e., 355,000 € instead of 260,000 €).

The method using cash as excess cash only is acceptable (i.e., 220,000 €) considering the fact that determining the right amount of operating cash is difficult and somewhat arbitrary. If the cash position is substantial, the operating cash component is much smaller than the essential excess cash component.

The author recommends using the method splitting cash into operating and excess cash in order to fairly appraise the amount of capital employed.

Capital employed = long – term operating assets + operating cash + non – cash working capital from operations = equity

The method considering cash as excess cash only is acceptable and practical.

Capital employed = long – term operating assets + non – cash working capital from operations = equity + financial debt

Using the broad and common working capital formula is not always meaningful for a company with large cash holdings or large non-core assets.

## ***1.3.3 Non-Core Assets***

Non-core assets are non-essential and non-strategic assets that are not

required for running the company's core operations. These non-operating assets do not generate recurring EBITDA or EBIT. Assets such as excess or surplus cash, investments in marketable securities or non-strategic minority holdings (non-consolidated) belong to this asset category. Land and real estate investments can also be non-core assets if they are not necessary for the company's business operations (i.e., they were probably necessary in the past but no longer in use today). If sold, the net proceeds would boost the cash holdings of the company and could be used to reduce debt. The proceeds could also be used to pay dividends. These non-core assets may generate non-operating income (interest or rent) and expenses (property tax) but the net impact on the company's bottom line is usually limited.

Subtracting non-core assets from debt is similar to an EV calculation. Unlike EV, however, these assets remain book-value and not market-value based.

### ***1.3.4 Definition of Enterprise Value***

Enterprise value is commonly used as an important valuation tool by advisory firms in Mergers and Acquisitions (M&A) and in Private Equity activities. The EV aggregate has also become increasingly important for stock market analysis when using ratios such as EV to EBITDA multiple and all its possible variations. EV multiples are valuation metrics that are highly complementary to the classic Price to Earnings ratio (or P/E ratio).

Enterprise value (EV) is the **market value** of the core operating or business assets of a company. It is a strong and proven concept that clearly links operating assets, debt and cash. It can be explained either by the asset side or the equity side of the balance sheet, and thus it has a dual definition.

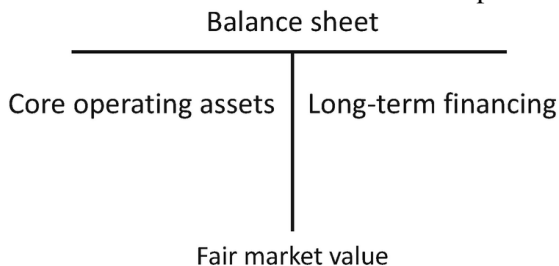
Enterprise value can also be defined as the theoretical takeover price of a company, and it is inclusive of the payoff of all capital claims (i.e., equity + debt + preferred shares/stocks). This takeover price would allow for the purchase of the company's entire capital base and the repayment of all incurred financial debt (including lease obligations), while enabling the buyer to benefit from non-core assets (including excess cash) that could contribute to its debt repayment. In this way, we can understand enterprise value as the price tag of a "debt-free" company.

Enterprise value also represents the total amount of capital invested by common or preferred shareholders, long-term or short-term debt holders, or any additional long-term provider of funds to the company. Even a short-term loan provider is considered a long-term capital investor because short-credit facilities are typically renewed on an annual basis.

A trade debt (under accounts payable) is not an interest-bearing debt and should not be included in the category of capital invested. The goal of a supplier is to deliver the goods or services that are needed throughout the course of the business cycle, not to provide funding. Accounts payable are included in the calculation of the non-cash working capital from operations (i.e., net working capital).

One area of difficulty is minority interest (non-controlling interest) which is added to provide consistency within EV ratios. If the parent company's EBITDA includes 100% of the subsidiary's EBITDA, it seems fair to include 100% of the complete long-term capital of the subsidiary. It is also consistent with the dual aspect definition of EV, as 100% of the subsidiary's operating assets are consolidated. If minority interest were not included on the equity and liability side, both definitions of enterprise value would result in different and inconsistent results.

Figure 1.12 illustrates the above definition of enterprise value.



**Fig. 1.12** Operating assets and long-term financing

As a reminder, for a consolidated balance sheet, non-controlling interest (NCI) or minority interest represents the portion of “total capital” not directly owned by the shareholders of the parent company.

## ***EV Is Valued at Market Price***

The terms market price, fair market value, market value, mark-to-market and market capitalization are used interchangeably throughout the book, but they are clearly defined as a separate category from book value. The term “fair market value” will be used for assets outside of real estate properties. The underlying assumption is that is the price of an asset must be reasonably fair and reliable, unless the asset is liquidated.

For a listed company traded on a reasonably efficient market, the market cap can replace the fair market value of equity. For small caps that are quoted on markets with poor liquidity, using market cap may be



problematic, and thus the term “fair market value” of equity. The term “fair” before market value emphasizes the fact that the market must be efficient. In this way, “the price” reflects the fundamental value.

With behavioral finance, however, we know that this is not always true. The existence of speculative bubbles is a case in point, and the existence of alpha (i.e., abnormal excess return) proves that stocks are often under or overvalued. Therefore, the term market value remains an estimation of the fair value of equity.

## ***EV and the Market Value of Equity***

Enterprise value is often confused with company value, or in other words, it is confused with the fair market value of its equity or its market capitalization in an efficient market. It is crucial to note that they are not equivalent to one another.

Enterprise value $\neq$ company value
---------------------------------------

If the market is efficient, the company value should reflect its level of debt and therefore risk. Moreover, it should reflect the level of non-core assets (including excess cash) that a company controls.

For example, when you buy a company, you own the assets and benefit from the cash, but you also carry the debt. The more productive assets a company controls and the more cash a company holds, the less debt a company carries and thus the more valuable a company is.

Enterprise value is the value of the entire business operations of a firm, while equity value is the market capitalization of a firm (or the fair market value of its equity for a non-listed company).
---

Both metrics are equal only when financial debt is equal to excess cash or alternatively, if both financial debt and excess cash are equal to zero.

$EV = FMV \text{ equity} + [FMV \text{ debt} - \text{excess cash (or non-core assets)} = 0]$ .

$EV = FMV \text{ equity}$  (private company).

With FMV equity defined as the fair market value of equity.

### ***1.3.5 The EV Concept Applied to***

# Comparable Companies

A simple example will help the reader better understand the fundamental equation that links operating assets (EV), equity, debt and cash.

Let us take four comparable companies with equivalent operating assets (i.e., same business assets) generating equivalent operating income.

What are the market values of equity for companies A, B, C and D? (Fig. 1.13).

Company A		Company B	
OA = 100	Equity A?	OA = 100	Equity B?
Cash = 0	Debt = 0	Cash = 0	Debt = 50

Company C		Company D	
OA = 100	Equity C?	OA = 100	Equity D?
Cash = 50	Debt = 0	Cash = 50	Debt = 50

OA = operating assets (net)                      Mark-to-market balance sheets

**Fig. 1.13**Comparable companies with the same operating assets

The fundamental equation defining a balance sheet appears as follows:

$$\text{Operating assets} + \text{cash (i.e., assets)} = \text{equity} + \text{debt (i.e., equity + liabilities)}$$

Consequently ,

$$\text{Equity} = \text{operating assets} + \text{cash} - \text{debt}$$

If the comparable operating assets of the four companies are mark-to-market, then  $EV(A) = EV(B) = EV(C) = EV(D) = 100$ , consequently

- Market value of equity A (MVE A) =  $100 + 0 - 0 = 100$
- Market value of equity B (MVE B) =  $100 + 0 - 50 = 50$
- Market value of equity C (MVE C) =  $100 + 50 - 0 = 150$
- Market value of equity D (MVE D) =  $100 + 50 - 50 = 100$

If the market is efficient, the equity market value should always reflect the value of operating assets, cash and debt. A comparable company (B) carrying a large debt and no cash (i.e.,  $MVE = 50$ ) is worth less than a comparable company (C) holding a large cash position and no debt (i.e.,  $MVE = 150$ ).

It may sound logical, even trivial, but an investor who is purely fixed on P/E ratios may overlook this aspect (i.e., the importance of debt and cash), thus overlooking the benefits brought by enterprise value and its associated ratios.

### ***1.3.6 The EV Concept Applied to Real Estate Investments***

A detailed example involving real estate will help the reader better understand the essential difference between equity and company valuations.

#### ***Successive Sales of Real Estate Property Alpha***

Imagine that real estate property Alpha (a well-located villa on a large tract of land) was acquired by three successive buyers in 2018, 2019 and 2020 for the identical price tag of \$600,000, net. (In this simplified example, we will not take into consideration real estate agent or notary fees).

Each of the three successive purchasers acquired this property directly through a new real estate company, and so they did not buy back the shares of the previous owner.

- The first buyer (2018) made a down payment of \$600,000 (equity), no credit financing was required.
- The second buyer (2019) made a down payment of \$200,000 (equity) and consequently borrowed \$400,000.
- The third buyer (2020) invested only \$50,000 (equity) and borrowed \$600,000. He therefore had a cash deposit of \$50,000 in his company's bank account.

Figure 1.14 illustrates the three successive purchases.

Company Alpha I (2018)		Company Alpha II (2019)	
Villa Alpha \$500,000 (EV)	Equity \$500,000	Villa Alpha \$500,000 (EV)	Equity \$200,000
	Debt \$0		Debt \$300,000

Company Alpha III (2020)	
Villa Alpha \$500,000 (EV)	Equity \$50,000
Cash \$50,000	Debt \$500,000

**Fig. 1.14** Successive villa Alpha's purchases in 2018, 2019 and 2020

The market value of the property (operating assets) does not change. It is always equal to \$600,000, regardless of the financing plan adopted or the year of purchase. However, the value of the respective real estate companies changes according to the three financing plans.

*Business valuation of the successive Alpha companies*

- In 2018, the value of company Alpha I (value of shareholders' equity) is \$600,000 (this is the only case where the two "values" are equal,  $EV = \text{market value of equity}$ )
- In 2019, the value of company Alpha II (value of shareholders' equity) is  $\$600,000 - \$400,000 = \$200,000$
- In 2020, the value of company Alpha III (value of shareholders' equity) is  $\$650,000 - \$600,000 = \$50,000$

The market value of all operating assets can be calculated as the market value of equity plus the market value of net debt (i.e., \$600,000).

*Operating assets calculation*

- Alpha I: operating assets =  $600,000 + (0 - 0) = \$600,000$
- Alpha II: operating assets =  $200,000 + (400,000 - 0) = \$600,000$
- Alpha III: operating assets =  $50,000 + (600,000 - 50,000) = \$600,000$
- The value of operating assets remains constant (no depreciation and amortization or D&A applied)

In this simplified example, the book or historical value of the operating assets (the villa) is equal to its market value. There is no significant difference between the two (short time span).

# Creation of a New Lot, Beta, Within the Large Tract of Land in 2020

The final buyer, an experienced businessman, decides to create and sell a new lot within his large acreage, estimated at \$50,000 by his notary.

It can be assumed that the value of the property remains almost identical, and the rental value of the property Alpha will only change marginally. The magnificent villa is still surrounded by a substantial beautiful garden.

The additional lot Beta and the excess cash become non-core assets, and the lot creation increases the market value of equity by \$50,000. These non-core assets reduce the buyer’s overall debt by \$100,000 (net debt = debt – non-core assets).

*Non – Case assets* = \$50, 000 (new lot) + \$50, 000 (excess cash) \$100, 000

Figure 1.15 illustrates the impact of Beta on company Alpha.

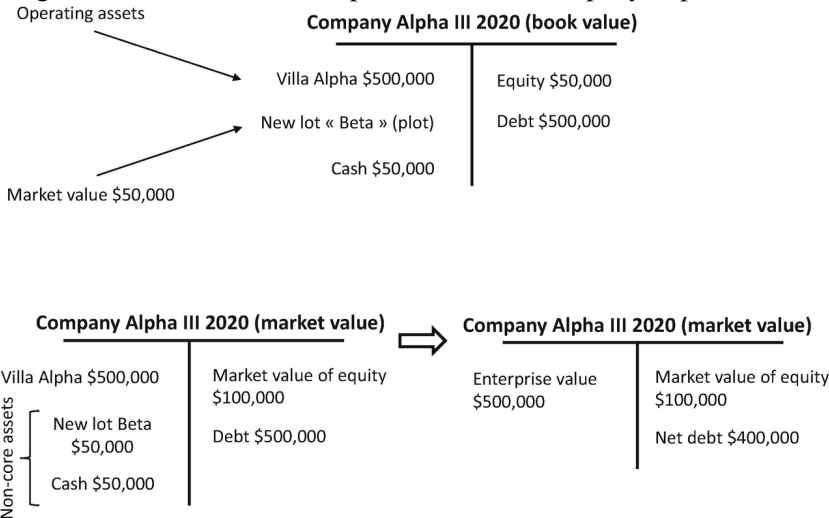


Fig. 1.15 Impact of lot Beta in 2020

## 1.3.7 EV Equations

The fundamental equations defining enterprise value (EV) are listed below (Fig. 1.16):

- For a non-listed company (non-publicly traded) :



Market value of operating assets (EV) = fair market value of equity + market value of financial debt and lease obligation

- For a listed company (usually consolidated) :

Balance sheet	
Net operating assets or Enterprise value	Market cap (incl. pref shares) Minority interest Financial debt – non-core assets

Market price

Financial debt = interest bearing debt, short- & long-term

Preferred shares & minority interest are included in the “total equity” section of the balance sheet

**Fig. 1.16**EV for a listed and consolidated company

Market value of operating assets (EV) = market capitalization + market value of minority interest + market value of fina

*We define market capitalization as follows:*

Market cap = [common shares outstanding × current market price of the common shares] + [preferred shares outstanding

*Preferred shares need to be included in the EV calculation, whatever the used classification (equity, debt or hybrid instruments?).*

*We define net operating assets as follows:*

Net operating assets = operating assets (non-current and current, including operating cash) – current operating liabilities.

Here is a basic, simplified equation for EV, applicable for most private (non-listed) companies (Fig. 1.17):

Balance sheet	
Net operating assets or enterprise value	Equity at fair market value Financial debt at book value – cash

Financial debt = interest bearing debt, short- & long-term

Cash or non-core assets

**Fig. 1.17**Simplified EV for a non-listed company

$EV = \text{Equity at fair market value} + \text{book value of financial debt} - \text{cash}$



# Market Value of Debt Versus Book Value of Debt

The market value of debt is different from the book value of debt

*Example with a specific loan*

- Outstanding loan (book value) = \$100,000
- Interest-only loan = \$3000 yearly (interest expense)
- Principal paid in two years (bullet) = \$100,000
- Current two-year interest rate = 2%

Market value of the loan =  $\$3000 / (1 + 2\%) + \$3000 / (1 + 2\%)^2 + \$100,000 / (1 + 2\%)^2 = \$101,942$  (i.e., different from

The interest rates have decreased from 3% down to 2%, and thus the debt value has increased accordingly.

The book value of debt replaces the market value of debt in most cases. The book value of debt (i.e., amount of debt outstanding = initial debt amount – cumulative principal payments) is a good quality substitute, and sometimes it may be the only available data.

## Market Capitalization Definition

If the stock market is fully efficient, market capitalization should be equal to the following :

$$\text{Market capitalization} = EV \text{ (enterprise value)} - \text{market value of debt} + \text{market value of non - core assets (including exc}$$

## 1.3.8 EV Calculation (MTM Accounting)

Let us consider the following simplified balance sheet of company SEGA, mark-to-market (MTM, also known as the fair market value) (Table 1.3).

Table 1.3Company SEGA’s balance sheet, MTM

Company SEGA, fair market value, in \$Year X		
50000 assets fair (operating) value		
50000 total debt (operating)		
50000 net day-to-day cash (operating)		
5000 non-core assets (100 in surplus cash)		
72000 assets and liabilities		

# Company SEGA's EV Calculation

We calculate SEGA's enterprise value as follows:

Market value of operating assets = market value of equity + market value of net debt

- First method (asset side)
- $EV = \text{Fixed operating assets} + \text{current operating assets} - \text{current operating liabilities}$
- $EV = 1000 + 500 + 50 - 400 = \$1150,000$
- Second method (liability side)
- $EV = \text{equity at fair market value} + \text{debt} - \text{non-core assets}$
- $EV = \text{equity at fair market value} + \text{net debt}$
- $EV = 600 + 1200 - (550 + 100) = 600 + 550$
- $EV = \$1150,000$

The adjusted balance sheet appears as follows (Table 1.4):

Table 1.4Company SEGA's balance sheet showing EV

Company SEGA, fair market value, in \$Year X			
Market value of operating assets (EV)			
Non-core assets			
Total			

## 1.3.9 EV Calculation (Using DCF Method)

Let us now approach company SEGA using the discounted cash flow method or model (DCF with the direct method).

First, we analyze SEGA's projected free cash flows to the firm (FCFF) (Table 1.5).

Table 1.5Company SEGA's FCFF

Normalized flow 6						
50,000						

*Reminder:* FCFF is the cash flow available to all the firm's suppliers of capital (i.e., stakeholders) once the firm has paid off all operating and tax expenses and has paid for investments needed to maintain the firm's operating assets (i.e., capex + growth in NCWC).

Growth in NCWC is defined as the investment or change in non-cash



working capital (from operations ).

$$FCFF = \text{EBITDA} - \text{tax rate} (\text{EBITDA} - \text{depreciation and amortization}) - \text{investments in NCWC} - \text{net investments (cap)}$$

The discount factors used in the 2-stage DCF method are:

- Perpetual growth rate  $g = 1.5\%$  (normalized cashflows will grow at this rate following year six)
- Weighted average cost of capital (WACC) =  $6\%$

As a reminder, the WACC formula is the following:

$$FCFF = \text{EBITDA} - \text{tax rate} (\text{EBITDA} - \text{depreciation and amortization}) - \text{investments in NCWC} - \text{net investments (cap)}$$

The WACC formula using simplified EV is as follows:  $\text{WACC} = (\text{market cap}/\text{EV}) \times \text{cost of equity} + (\text{book value of debt}/\text{EV}) \times \text{net cost of debt (after tax)}$

An even more simplified WACC formula using book value instead of market value follows thereafter:  $\text{WACC} = (\text{equity}/\text{capital employed}) \times \text{cost of equity} + (\text{debt}/\text{capital employed}) \times \text{net cost of debt}$

Reminder: net cost of debt (i.e., after interest tax deduction)  $<<$  cost of equity (for a non-leveraged company)

*Calculation of the terminal value at time 0*

$$\text{Terminal value (t = 5)} = 57,500/(6\% - 1.5\%)$$

$$\text{Terminal value (t = 5)} = \$1,277,778$$

$$\text{Discounted terminal value (t = 0)} = 1,277,778/(1 + 6\%)^5 = \$954,830$$

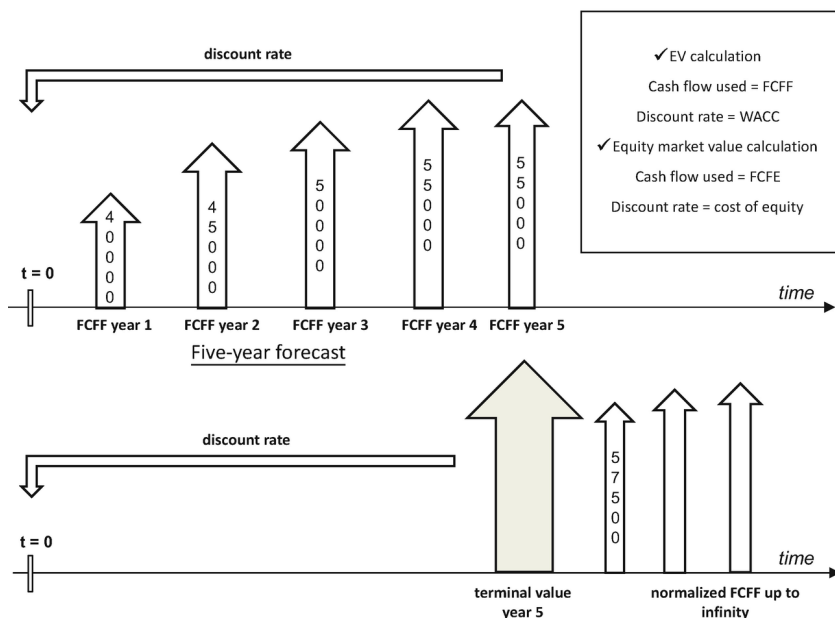
*Calculation of the five successive FCFF at time 0*

$$\begin{aligned} \text{Discounted value of the five yearly FCFF (t = 0)} &= 40,000/(1 + 6\%)^1 \\ &+ 45,000/(1 + 6\%)^2 + 50,000/(1 + 6\%)^3 + 55,000/(1 + 6\%)^4 \\ &+ 55,000/(1 + 6\%)^5 = \$204,431 \end{aligned}$$

In this case, enterprise value is the sum of the discounted operating cash flows generated by the company in the future (direct method).

$$EV = 954,830 + 204,431 = \$1,159,261, \text{ rounded to } \mathbf{\$1,150,000}$$

Figure 1.18 illustrates the discounting method used for the calculation of EV.



**Fig. 1.18** EV direct calculation with discounted FCFF and terminal value

Enterprise value can also be calculated by what is called the indirect method. First, future FCFE are discounted using cost of equity, and it can be summed up at the starting point ( $t = 0$ ) in order to calculate the market value of equity. Net debt is then added to equity market value in order to obtain the enterprise value.

The DCF method with FCFF or FCFE cash flows or the comparable company analysis is a common tool used for company's valuations (i.e., EV or equity).

## ***On the Importance of Non-Core Assets***

We now see the importance of separating non-core assets from operating assets. Despite the fact that non-core assets are not generating future FCFF, they are valuable assets and cannot be omitted. Moreover, mixing the two components would result in inconsistent EV valuations. In the present case, the equity market value of SEGA is equal to  $\$1150,000 - \$1200,000 + \$650,000 = \$600,000$  and NOT  $\$1150,000 - \$1200,000 = -\$50,000$ .

The non-core assets cannot be ignored.

# 1.4 Key Takeaways on Key Financial Metrics and Enterprise Value

Here are three essential metrics used in financial ratios (Table 1.6):

Table 1.6 Essential metrics

EBITDA	Operating profit + depreciation + amortization
EBIT	Operating profit or income
EV	Operating assets or capital employed at market value

### Limitations

- EBITDA is a non-standardized metric and therefore subject to conflicting interpretations or even manipulations. Free cash flow metrics represent good alternatives.
- EBITDA must be linked to the level of investment needed (capex ) for its maintenance and expansion.
- Separating non-core assets (including excess cash) from core assets is an essential, however complex, task. Non-core assets can significantly reduce debt and affect EV.
- Calculation of EV should preferably be concomitant with the closing date of a balance sheet in order to get synchronized debt valuation and capitalization.
- Adjusted net income, excluding non-recurring items, is an essential input for the measurement of financial profitability.

## References and Further Reading

Anthony, Robert N., and Reece James S. 1989. *Accounting: Text and Cases*. Irwin.

Coulon, Yannick. September 2018. *L’essentiel des ratios financiers*. Maxima

Laurent du Mesnil.

———. January 2017. *Guide pratique de la finance d’entreprise*. Gualino.

DeChesare Brian. 2017. Equity Value, Enterprise Value, and Valuation Multiples – Written Guide (PDF). *Breaking Into Wall Street*.

Quiry, Pascal. 2019. *Le Fur. Finance d’entreprise 2020 de Pierre Vernimmen*. Dalloz.

Stowe, John D., Thomas R. Robinson, Jerald E. Pinto, and Dennis W. McLeavey. August 2002. *Analysis of Equity Investments: Valuation*. AIMR, CFA Institute.

Thauvron, Arnaud. 2013. *Evaluation d'entreprise*. 4th ed. Paris: Economica.

Walsh, Ciaran. 2008. *Key Management Ratios*, 4th ed. Financial Times Series. FT Prentice Hall. Pearson Education Limited.

## 2. Efficiency Ratios

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### Abstract

The second chapter focuses on working capital and its associated metrics, namely inventory days, accounts receivable and accounts payable days.

It differentiates between working capital and non-cash working capital from operations. Working capital management is essential to provide sufficient cash for operations. Several brief case studies and illustrations help the reader understand the concept and review the application of working capital metrics in a business context. Key takeaways on working capital metrics and their limitations conclude the chapter.

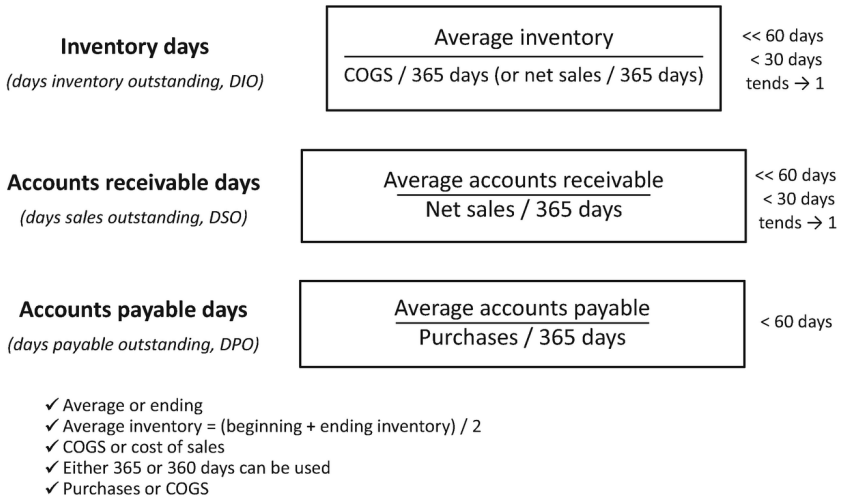
**Keywords** Non-cash working capital Working capital management Inventory days Accounts receivable days Accounts payable days

## 2.1 Efficiency Ratios

It is crucial for a company to effectively manage the cash required by its current operations. If cash is badly managed, the draw on liquidity can prove fatal. The efficiency ratios try to analyze the different key components driving the demand on operating cash. In particular, they indicate whether the current assets and liabilities are optimized.

The three main efficiency ratios used are: inventory days, accounts receivable days and accounts payable days (Fig. 2.1).

Efficiency in operating liquidity



Reminder: The absolute ratio number is industry-specific, the trend is the key!

**Fig. 2.1**Efficiency in operating liquidity

For a general introduction, we need to emphasize that each individual company should be compared against its industry standards or the best players or competitors in the same sector. The 30 or 60-day limits are only general rules of thumb, but they can still be useful guidelines.

The “<<” sign indicates that the number of days should be much lower than the 60-day limit for both days inventory outstanding (DIO) and days sales outstanding (DSO). Paying suppliers beyond 60 days may even be illegal in certain countries.

Ideally, DIO or DSO ratios need to be as close to zero as possible but remain reasonable below 30 days. For certain food retailers, having a DIO close to one is a must as their product have a very limited lifetime.

Driving the number of DPO days up could be tempting in cash management. However, the room for maneuver may be limited by the relative bargaining power of the partners involved. A high-quality supplier cannot be easily replaced, and therefore pushing the number of accounts payable days up can be a risky bet for a company. Improving its own cash position at the cost of its key supplier may be an effective short-term tactic, but it is not a successful and ethical long-term strategy. Consequently, pushing the DPO upwards may not always be applicable.

Let us now review each efficiency ratio in detail.

## 2.2 Inventory Days

Inventory days are defined as the average number of days' sales "invested" in inventories. One question we must answer is how many days' worth of sales are locked in inventories?

- Cost of goods sold (or cost of sales) is preferred as a denominator to sales, if known.
- Average inventory = (beginning + end inventory)/2

The inverse approach to inventory days is the inventory turnover ratio. The example below illustrates the symmetric calculation:

- Retail company
- Net sales/year = \$3,650,000
- Cost of goods sold (COGS) /year = \$2,555,000
- Beginning inventory = \$400,000
- Ending inventory = \$400,000
- Net sales/day = \$3,650,000/365 days = \$10,000
- COGS /day = \$2,555,000/365 = \$7000

### *Inventory days calculation*

Inventory days (sales) = \$400,000/\$10,000 = **40 days**

Inventory days (COGS ) = \$400,000/\$7000 = **57.14 days**

Inventory turnover ratio (COGS ) = 365/57.14 = **6.4 times**

Inventory turnover ratio (COGS ) = \$2,555,000/  
\$400,000 = **6.4 times**

$$365/\text{inventory days} = \text{inventory turnover ratio}$$

According to the above calculations, the monetary equivalent of two months' worth of sales are locked in the company's inventories, and its inventories turn over six times per year.

### *Interpretation*

Inventories "consume" cash: the fewer the number of days, the greater the turnover ratio and the better the company will do in minimizing its inventory costs and converting inventories into cash. This reasoning is

valid if “just in time” management is applied, and the company does not run out of essential products. For comparable companies, a higher inventory turnover ratio could potentially signal a higher profitability and inventory quality (less obsolescence) as more products are moving faster to customers.

## 2.3 Accounts Receivable Days

Accounts receivable days are defined as the number of days’ sales “invested” in accounts receivable. Here we must ask how many days’ worth of sales are tied up in accounts receivable? This ratio is also called the average collection period for the receivables.

The inverse approach to accounts receivable days is the accounts receivable turnover ratio.

The example below illustrates the symmetric calculation:

- Retail company
- Outstanding accounts receivable = \$250,000
- Net sales/year = \$3,650,000
- Net sales/day =  $\$3,650,000 / 365 \text{ days} = \$10,000$

*Accounts receivable days calculation*

Accounts receivable days =  $\$250,000 / \$10,000 = \mathbf{25 \text{ days}}$

Accounts receivable turnover ratio =  $365 / 25 = \mathbf{14.6 \text{ times}}$

Accounts receivable turnover ratio =  $\$3,650,000 / \$250,000 = \mathbf{14.6 \text{ times}}$

$365 / \text{accounts receivable days} = \text{accounts receivable turnover ratio.}$

It takes the company 25 days to collect an average invoice, which means that the outstanding accounts receivable is worth 25 days of sales. Thus, the company turns over or collects its receivables 15 times per year.

### *Interpretation*

Receivables “consume” cash: the fewer the number of days, the greater the turnover ratio, and the better the company is in terms of collecting its invoices and converting them into cash.



## 2.4 Accounts Payable Days

Accounts payable days are defined as the average number of days' purchases outstanding. Here we must calculate how many days of purchases are due to the suppliers. Other possible terminology for this calculation is days payable outstanding (DPO). Additionally, purchases can sometimes be replaced by COGS.

The inverse approach to accounts payable days is the accounts payable turnover ratio.

The example below illustrates the symmetric calculation:

- Retail company
- Outstanding accounts payable = \$300,000
- Beginning inventory = \$400,000
- Ending inventory = \$400,000
- Cost of goods sold = \$2,555,000 = Purchases
- Inventory purchases/day = \$2,555,000/365 days = \$7000

### *Accounts payable days calculation*

Accounts payable days =  $\$300,000 / \$7000 = 42.86$  days

Accounts payable turnover ratio =  $365 / 42.86 = 8.5$  times

Accounts payable turnover ratio =  $\$2,555,000 / \$300,000 = 8.5$  times

$$365 / \text{accounts payable days} = \text{accounts payable turnover ratio}$$

It takes the company on average 43 days to pay its suppliers, thus its accounts payable turns over 8.5 times a year.

### *Interpretation*

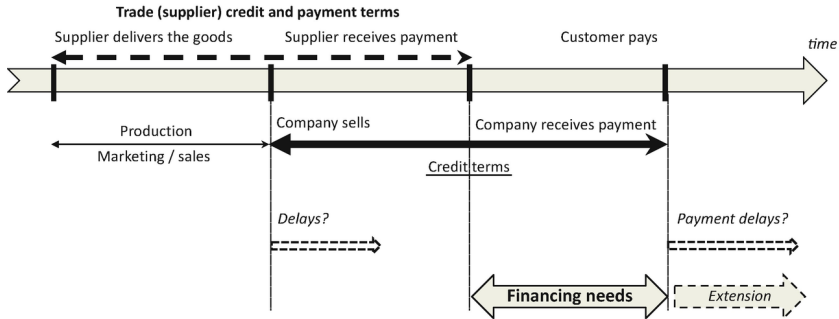
“Payables” keep cash on hand: the greater the ratio in days, the more secure the cash position of the company. There are limitations, however, of up to roughly 60 days, as suppliers are partners and not bankers!

A high turnover rate indicates that suppliers (vendors) are paid in due time, which can help in future negotiations with other potential suppliers. There is therefore a “fair balance” to strike between a company favoring its own working capital and that of its suppliers. If suppliers offer good financial incentives (early payment discount), it may be of interest for the company to drive the number of days down.

# 2.5 Working Capital Definitions

Working capital is a useful metric for determining the total amount of operating cash needed. The reason for this is that it shows how operations are financed.

Most of the financing needs can be explained by the time gap that exists between the cash outflow paid to suppliers and the cash inflow generated by customers. Figure 2.2 illustrates this gap.



**Fig. 2.2**Funds needed to finance operations

Working capital is a widely used concept with different classifications. We will present the main definitions here.

*The classic and broad working capital formula is as follows :*

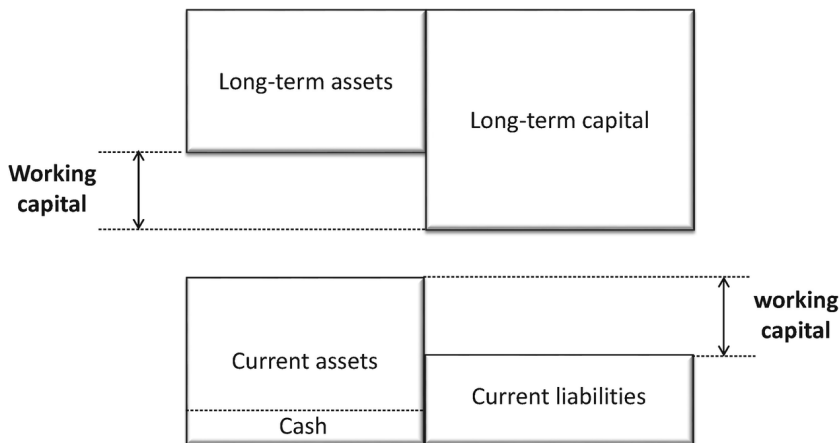
$$\text{Working capital} = \text{current assets (including cash and cash equivalents)} - \text{current liabilities (including short - term debt)}$$

In the above formula, all current assets and liabilities are included, both operational and financial.

Working capital can also be defined as the surplus of long-term capital over fixed assets:

$$\text{Working capital} = \text{long - term capital} - \text{long - term assets}$$

Both equations are perfectly equivalent as shown below (Fig. 2.3).



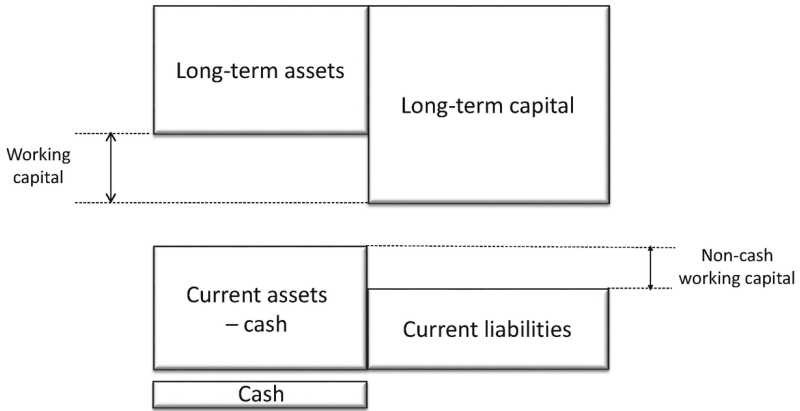
**Fig. 2.3**Two ways to look at working capital

*We can also use the following working capital formula without cash :*

$$\text{Non - cash working capital} = \text{current assets (excluding cash and cash equivalents)} - \text{current liabilities}$$

This non-cash working capital is defined as the difference between its non-cash current assets and its current operating liabilities. Cash is excluded from the equation as it does not create liquidity needs. Instead, it is the solution to liquidity.

Figure 2.4 illustrates the difference between working capital and non-cash working capital.



Working capital needs/ requirements (from operations)  
 = current operating assets (excl. cash) – current operating liabilities  
 = inventories + accounts receivable – accounts payable – wages and taxes payable

**Fig. 2.4** Working capital and non-cash working capital

*We can apply the following formula when the focus is strictly on operations :*

Non – cash working capital from operations = working capital needs or requirements from operations = current operatin

In line with the formula above, all current or short-term financial liabilities are excluded from current liabilities. Cash and cash equivalents are always excluded from the equation. Remember, cash does not require financing!

As a reminder, cash equivalents include items such as short-term notes, [marketable securities](#) and money market funds. These have no risk attached.

*In most cases, it is sufficient to obtain a high-quality overview by focusing on inventories, accounts receivable and accounts payable :*

Non – cash working capital (from operations) = inventory + accounts receivable – accounts payable.

The term “from operations” is used extensively in the book and refers to these three main operating components (plus if significant: wages, salaries and taxes payable).

**Definition of “Net” Cash**

*Net cash* = cash (on the asset side) – short – term financing (on the liability side)

Working capital – non – cash working capital = *net cash*

***Positive or Negative Non-Cash Working Capital Needs (NCWC needs)***

Non-cash working capital needs represent the amount of capital required by a company for it to sustain its operating activities.

- It is usually **positive** in sectors such as the manufacturing sector in which inventories and accounts receivable exceed by far the amount of credit that is granted by suppliers. A positive figure indicates a financing need.
- It can also be **negative** (in deficit) in sectors such as the service (insurance) or retail industry, where non-cash working capital becomes a source of cash for the company. The current operating assets are reduced to a minimum either because inventories are non-existent or because customers/clients pay directly on delivery or in advance. A deficit in this case is a positive source of cash. The unearned revenue section can also be a major contributor (e.g., digital, sport or press services, on a membership or subscription basis).

Working capital, defined as the surplus of long-term capital over fixed assets, can be a major cash contributor to operations.

Short-term financing is the second cash contributor, and it closes the financing gap.

We must keep in mind that a working capital deficit (i.e., working capital including cash) indicates that the company seems to be illiquid (where current assets < current liabilities). However, a non-cash working capital deficit means that the business operations are financed by its short-term liabilities. If these current liabilities remain stable and properly managed throughout the production cycle, they have positive effects on the cash generation. In this book, the definition of “working capital” does not include cash (thus NCWC), since we take the view of focusing only on pure business financing needs.

## **2.6 Non-Cash Working Capital Financing**

Let us look at the following example showing the calculation and logics behind the financing of the non-cash working capital needs from operations.

The simplified balance sheet of company SEGI is displayed below (Table 2.1).

Table 2.1Company SEGI’s simplified balance sheet

Company SEGI in \$, year X			
190,000	Assets		
100,000	Long-term loans		
40,000	Accounts payable		
50,000	Short-term loans		
25,000	Cash		
190,000	Equity + liabilities		

Table 2.2 shows the working capital metrics for company SEGI.

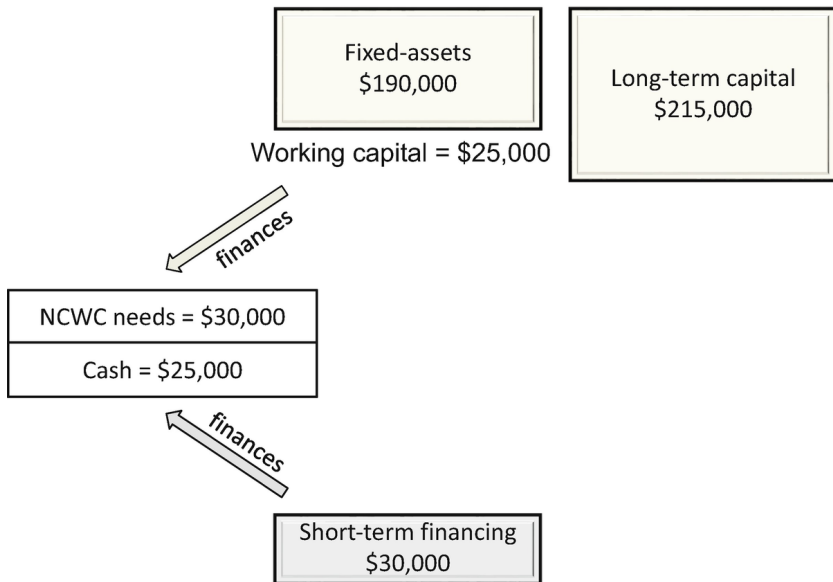
Table 2.2Company SEGI’s working capital metrics

Working capital management, in \$	Year X
190,000	Working capital
115,000	NCWC from operations
25,000	Net cash

The working capital metrics are calculated as follows:

- Working capital = (40,000 + 40,000 + 25,000) – (50,000 + 30,000) = (115,000 + 100,000) – 190,000 = **\$25,000**
- Non-cash working capital needs from operations = 40,000 + 40,000 – 50,000 = **\$30,000** (needs to be financed)
- Net cash = cash - short-term loans = 25,000 – 30,000 = – **\$5000**
- Net cash = working capital – non-cash working capital from operations = 25,000 – 30,000 = – **\$5000**

Figure 2.5 gives an overview of the NCWC financing for company SEGI.



**Fig. 2.5** SEGI's non-cash working capital financing

The working capital finances five sixths of the operating activities, while short-term loans finance the remaining balance.

As a general rule of thumb, short-term financial debt should not represent more than 50% of NCWC, and consequently working capital should finance more than 50% of NCWC.

## 2.7 Working Capital Management

Working capital management is the company's ability to efficiently manage its current assets in order to meet its current liabilities.

Converting working capital into working capital days allows efficient oversight, forecasting and comparison between companies.

This approach transforms an absolute "\$" number with limited significance into a relative day metric so that the figures can be easier to analyze and compare.

Working capital is expressed in terms of days of sales, where one day represents a fraction of yearly sales.



Non – cash working capital days (from operations) = inventory days + accounts receivable days – accounts payable day.

### *Formulas applied*

- One day of sales = yearly sales/365 days (or 360 days)
- Non-cash working capital days = non-cash working capital from operations/(sales/365 days)
- Inventory days = inventory/(sales/365 days)
- Accounts receivable days = receivables/(sales/365 days)
- Accounts payable days = accounts payable/(sales/365 days)

This simplified equation above, using the same denominator (i.e., daily sales), focuses on the three key operating components and allows for both efficient working capital management and easy implementation.

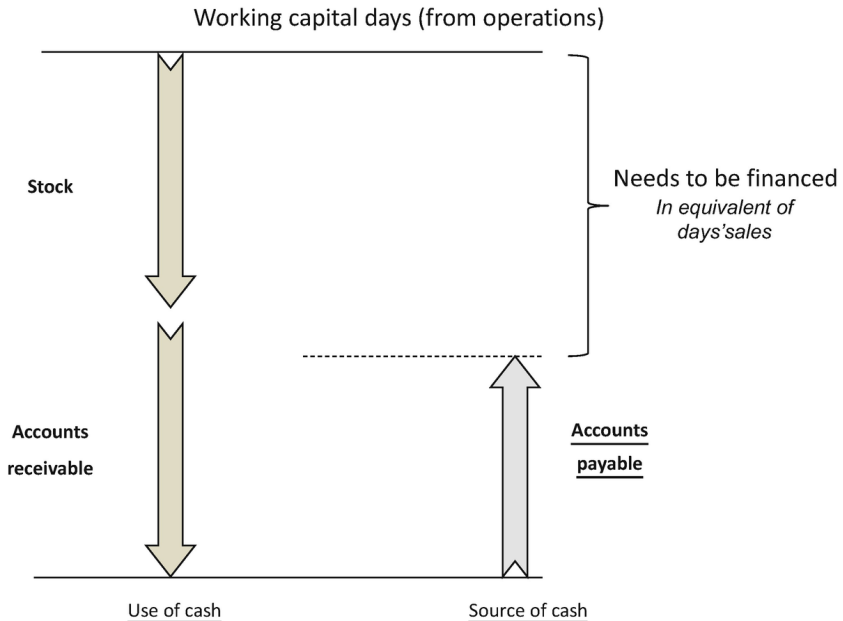
Another way to look at working capital days is to use the same definitions outlined in Fig. 2.1 (efficiency in operating liquidity) for inventory days (DIO) and accounts payable days (DPO).

$$\text{Cash conversion cycle (CCC)} = DIO + DSO - DPO$$

Average inventory and accounts payable days are divided by daily COGS (or possibly daily purchases for the payables) which makes the metric slightly more economically relevant but also more complex.

Figure 2.6 displays an overview of working capital days from operations.





**Fig. 2.6** Working capital days (from operations)

When “stock + receivables” < accounts payable, the difference becomes a source of cash. In this case, we have a NCWC deficit, thus a positive source of financing. A negative cash conversion cycle is intrinsically positive for a company.

*The following example shows how working capital days can be easily implemented:*

- Sales = \$365 million yearly or \$1 million per day
- Ending inventory = \$30 million or 30-days’ worth of sales
- Accounts receivable = \$80 million or 80-days’ worth of sales
- Accounts payable = \$10 million or 10-days’ worth of sales

#### *NCWC from operations calculation*

Non-cash working capital needs from operations =  $30 + 80 - 10$   
= \$100 million (this is the amount that needs to be financed)

Non-cash working capital needs from operations = \$100 million/  
\$1 million = 100 days’ worth of sales

100 days = 30 days + 80 days – 10 days

#### **Findings**

The above example shows us that this company should probably pay its suppliers at greater intervals. It also shows that there is too much cash tied

up in accounts receivable.

Improving the collection of receivables by only 20 days would reduce working capital needs by  $20 \times 1 \text{ million} = \text{\$20 million}$

80 days (i.e.,  $100 - 20$ ) = 30 days + 60 days (i.e.,  $80 - 20$ ) – 10 days

New non-cash working capital from operations needs after policy change = \$80 million

The company would save \$20 million in cash for other purposes.

## 2.8 Key Takeaways on Efficiency Ratios and Their Limitations

Here are the three main efficiency ratios used in the management of working capital (Table 2.3):

Table 2.3 Efficiency metrics

Ending inventory (EI)	Inventory/daily COGS << 60 days
Ending accounts receivable (AR)	Receivable/daily sales << 60 days
Ending payable (P)	Payable/daily purchases < 60 days

### Limitations

- If the company is involved in seasonal activities and its peak season does not coincide with the ending balance sheet date, the amount of working capital needed may be underestimated.
- Average inventory can replace ending inventory if too volatile.
- For a rapidly growing business, a meaningful measurement is the net change in non-cash working capital from operations. This capital spending component is often underestimated or even forgotten in projected calculations.
- It is preferable to establish an accounts receivable dating process (aging) to detect any long overdue customer invoices, even when the DSO ratio appears to be moderate or low.
- A high DPO ratio can either indicate a deliberate company policy or a difficulty in paying suppliers (check cash ratio).
- COGS can be a good substitute to purchases when these purchases fluctuate significantly from one year to another. This depends on the level of beginning and ending inventories (e.g., in case of strong stock replenishment).

Remember that the provided limits are rules of thumb and will differ by sector. Thus, it is important to check trends and competitors.

## References and Further Reading

Anthony, Robert N., and James S. Reece. 1989. *Accounting: Text and Cases*. Irwin.  
Coulon, Yannick. January 2017. *Guide pratique de la finance d'entreprise*.  
Gualino.

———. September 2018. *L'essentiel des ratios financiers*. Maxima Laurent du  
Mesnil.

Quiry, Pascal, and Yann Le Fur. 2019. *Finance d'entreprise 2020 de Pierre  
Vernimmen*. Dalloz.

Stowe, John D., Thomas R. Robinson, Jerald E. Pinto, and Dennis W. McLeavey.  
August 2002. *Analysis of Equity Investments: Valuation*. AIMR and CFA Institute.

Thibierge, Christophe. November 2013. *Comprendre toute la finance*, 2ème édition.  
Vuibert.

Walsh, Ciaran. 2008. *Key Management Ratios*, 4th ed. Financial Times Series. FT  
Prentice Hall. Pearson Education Limited.

# 3. Key Liquidity and Solvency Ratios

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## Abstract

The third chapter examines the liquidity and solvency of a company. Although different in nature, these ratios are very much interrelated as they both address a company's creditworthiness.

Short case studies and illustrations help the reader understand these concepts. Key takeaways on liquidity/solvency ratios and their limitations conclude the chapter.

**Keywords** Liquidity Cash ratio Quick ratio Current ratio Solvency

## 3.1 Liquidity Versus Solvency

There is often some confusion between liquidity, solvency and financial leverage. These concepts are interrelated, but the time frame and the scope of debt involved may be different.

Liquidity applies to the immediate future of a company, usually within one year, and is mainly operational. In comparison, solvency is more focused on the long-term. Financial leverage is strictly linked to the level of debt financing (i.e., interest-bearing debt), while solvency encompasses

both operating costs and financial debt.

Here are some questions and points we can consider about these concepts.

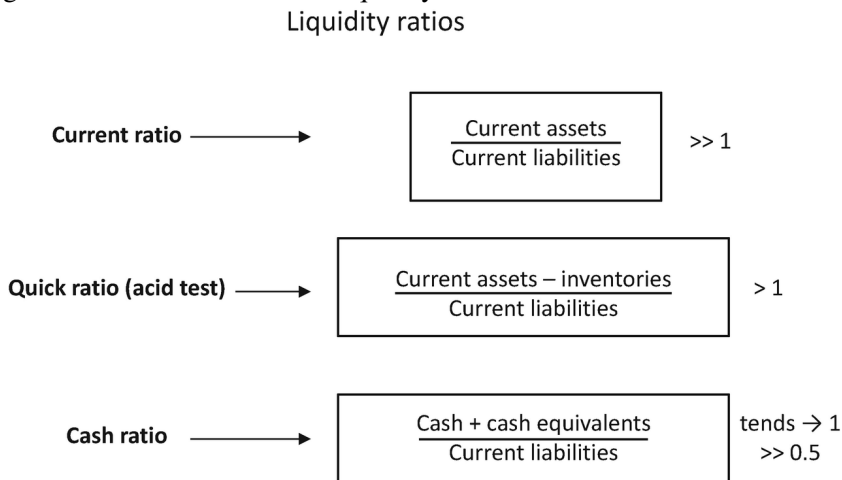
- *Liquidity*: Can a company address its short-term financial obligations? The focus is placed on the short-term, and on operations.
- *Solvency*: Are the company's assets larger than its liabilities? What is its net worth? Can the company operate over the long-term considering its financial obligations? The focus is placed on the long-term and on overall liabilities.

## 3.2 Key Liquidity Ratios

Most companies in financial distress go under not because they show low or no profitability but because they mismanage liquidity. On the positive side, cash provides a safety cushion and facilitates acquisition plans.

### 3.2.1 The Three Main Liquidity Ratios

Figure 3.1 lists the three main liquidity ratios.



Liquidity ratios indicate a company's ability to meet its current liabilities.

Reminder: The absolute ratio number is industry-specific, the trend is the key!

**Fig. 3.1** Liquidity ratios

As a general rule of thumb, the current and quick ratios need to be well over (i.e., >>) the value of 1. The cash ratio needs to tend toward one and should be at a minimum of 0.5 to provide a minimum cushion.

### 3.2.2 Liquidity Ratios of an Illiquid Company

#### Company Omega

Table 3.1 shows the simplified balance sheet for company Omega:

Table 3.1 Company Omega’s balance sheet

Company Omega (in \$1000)			
750	Equity		
250	Debt		
200	Accounts payable		
100	Notes payable		
50	Short-term debt		
50	Marketable Securities (MS)		
150	Inventories and equity		

*Detailed calculations for the three liquidity ratios*

- Current ratio =  $(500 + 200 + 50)/(250 + 100 + 400) = 750/750 = 1$  (weak ratio; should be >> 1)
- Quick ratio =  $(200 + 50)/(250 + 100 + 400) = 250/750 = 0.33$  (weak ratio; should be > 1)
- Cash ratio =  $50/(250 + 100 + 400) = 50/750 = 0.07 << 0.5$  (weak ratio; should be > 0.5)

*Detailed calculations for working capital metrics*

Working capital =  $500 + 200 + 50 - (250 + 100 + 400) = \$0$   
Working capital =  $550 + 200 - (550 + 200) = \$0$   
Non-cash working capital (from operations)  
=  $500 + 200 - (250 + 100) = \$350,000$   
Net Cash =  $0 - 350 = 50 - 400 = - \$350,000$

The above calculations show us that, at company Omega, inventories are too high, and cash is at a critical level. Further, non-cash working capital (NCWC) is solely financed by short-term loans, and working capital does not play a role. This constitutes an additional weakness.

Company Omega’s net debt to equity ratio is too high

[100% = (200 + 400 – 50)/550)] as well as off balance (short-term debt = 2× long-term debt).

This company is in an alarming situation and desperately needs refinancing.

### 3.2.3 Liquidity Ratios of a Financially Sound Company

#### Company Sigma

Table 3.2 shows the simplified balance sheet for company Sigma:

Table 3.2 Company Sigma’s balance sheet

Company Sigma (in \$1000)		
750 Plant and Equipment (PP&E)		
200 Other assets		
300 Accounts payable		
250 Long-term debt		
500 Short-term financial debt		
400 Total liabilities and equity		

*Detailed calculations for the three liquidity ratios*

- Current ratio =  $(200 + 250 + 300)/(300 + 200) = 750/500 = \mathbf{1.5}$  (good ratio;  $\gg 1$ )
- Quick ratio =  $(250 + 300)/(300 + 200) = 550/500 = \mathbf{1.1}$  (good ratio;  $> 1$ )
- Current ratio =  $300/(300 + 200) = 300/500 = \mathbf{0.6}$  (good ratio;  $> 0.5$ )

*Detailed calculations for working capital metrics*

Working capital =  $200 + 250 + 300 - (300 + 200 + 0) = \mathbf{\$250,000}$

Working capital =  $750 + 200 - (500 + 200) = \mathbf{\$250,000}$

Non-cash working capital from operations.

=  $200 + 250 - (300 + 200) = -\mathbf{\$50,000}$

Net Cash =  $300 - 0 = 250 - (-50) = \mathbf{\$300,000}$

Our calculations make it clear that company Sigma has adequate liquidity. No short-term banking facility is necessary, and the company has a net financial debt of –100 (cash > financial debt). Because the company is generating a negative NCWC , it has a surplus of operating cash.

The factors outstanding for the full evaluation of company Sigma

include the quality of inventories and the creditworthiness of the client portfolio (accounts receivable).

### 3.3 Key Solvency Metrics

As a general introduction to key solvency metrics, we can say that debt is the “enemy” of solvency, whether this debt is financial or operating. Therefore, all solvency ratios attempt to measure the relative size of debt versus assets or equity. The more debt a company has accumulated, the less solvent the company is.

Conversely, the larger the equity account (i.e., equity funds provided by the owners + accumulated profits and losses), the more solvent the company is. Equity plays the role of a capital buffer against potential losses, such as standard yearly losses or depreciated assets when assets’ book and market values are compared and tested for impairment.

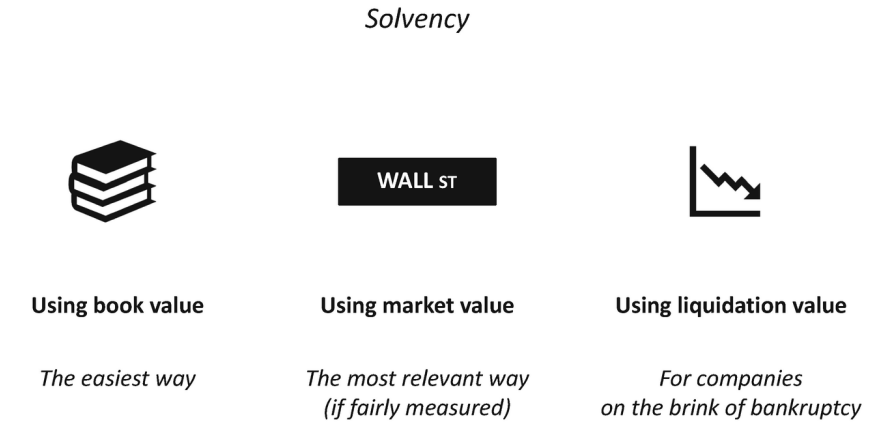
Consequently, a negative equity means that the company is not solvent, and this means that liabilities exceed assets!

Solvency and indebtedness are interrelated but with a different scope.

Solvency looks at the quality (i.e., valuation) and size of assets versus liabilities, while indebtedness (i.e., leverage) looks at the proportion of debt versus equity.

*Analyzing solvency is answering two basic questions:*

Tangible and intangible assets can be estimated under three valuation methods depicted below (Fig. 3.2).



**Fig. 3.2**Valuation methods used in solvency analysis



### 3.3.1 Net Worth and Solvency Ratios

A company is considered solvent if its net worth and tangible net worth are positive. A company with negative equity is not creditworthy.

$$\text{Net worth} = \text{total assets} - \text{total liabilities} = \text{equity}$$

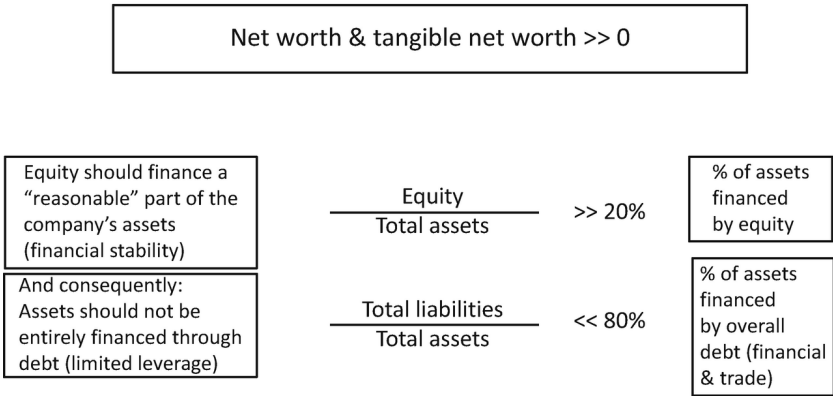
Intangible assets (goodwill, trademarks and other intellectual property) are difficult to evaluate and are often worthless outside the company’s own environment. It is therefore wise to be conservative when calculating net worth. Thus, the tangible net worth is excluding intangibles, including goodwill.

$$\text{Tangible net worth} = \text{total assets} - \text{intangible assets} - \text{total liabilities} = \text{equity} - \text{intangible assets}$$

When using market value, the market net worth is defined as :

$$\text{Market net worth} = \text{total assets (at market price)} - \text{liabilities (including off balance sheet obligations)}$$

Figure 3.3 shows the main solvency indicators to watch:  
Key solvency metrics



Reminder: The absolute ratio number is industry-specific, the trend is the key!

Fig. 3.3Key solvency metrics

# 3.4 Case Studies of Three Companies Showing Contrasting Financial Situations

The following examples provide some evidence that liquidity and solvency are interrelated. This is illustrated through three contrasting financial situations.

## 3.4.1 The Best-Case Scenario

Alpha is a company showing a good liquidity and solvency.

Table 3.3 depicts the simplified balance sheet for company Alpha.

Table 3.3Company Alpha’s balance sheet

Assets	Equity and liabilities	Year X	
Fixed assets (net)			
Long-term assets			
Accounts payable			
Current taxes payable			
Accounts receivable			
Financial debt (incl. Current Portion of Long-Term Debt or CPLTD)			
Cash (operating)			
plus cash			
Total			

## Liquidity Ratios

Table 3.4 provides an overview of the liquidity ratios.

Table 3.4Company Alpha’s liquidity ratios

Liquidity ratios	Company Alpha	
Cash ratio		
Quick ratio		
Cash ratio		

Detailed calculations for Alpha’s cash ratio and working capital

- Cash ratio =  $(50 + 190)/(260 + 90 + 90 + 10) = 240/450 = 0.53$
- NCWC from operations =  $150 + 300 + 50 - (260 + 90 + 90)$

= \$60,000

Alpha’s NCWC is financed entirely by its working capital (i.e., \$290,000).

The company has a large unearned revenue account, meaning it does not constitute a claim on cash but an obligation to provide a service or product. If the unearned revenue component is recurring, then it constitutes a stable source of short-term financing (non-cash working capital).

## Solvency Ratios

Table 3.5 provides an overview of the solvency metrics.

Table 3.5 Company Alpha’s solvency metrics

Solvency (in \$1000)	Company Alpha	
Surplus cash/debt/equity		
Net debt		
Net worth		
Liabilities/total assets		
Equity/assets		

*Detailed Alpha’s net debt and net worth calculations*

- Net debt (using surplus cash only) = debt – surplus cash  
= 460 – 190 = 270 (i.e., net debt/equity = **54%**)
- Net debt = debt – overall cash = 460 – 240  
= 220 (i.e., net debt/equity = **44%**)
- Net worth = 1400 – (1400 – 500) = **\$500,000** >> 0
- Tangible net worth = (1400 – 160) – (1400 – 500) = **\$340,000** >> 0

Company Alpha is in good short- and long-term financial positions as illustrated below (Fig. 3.4).

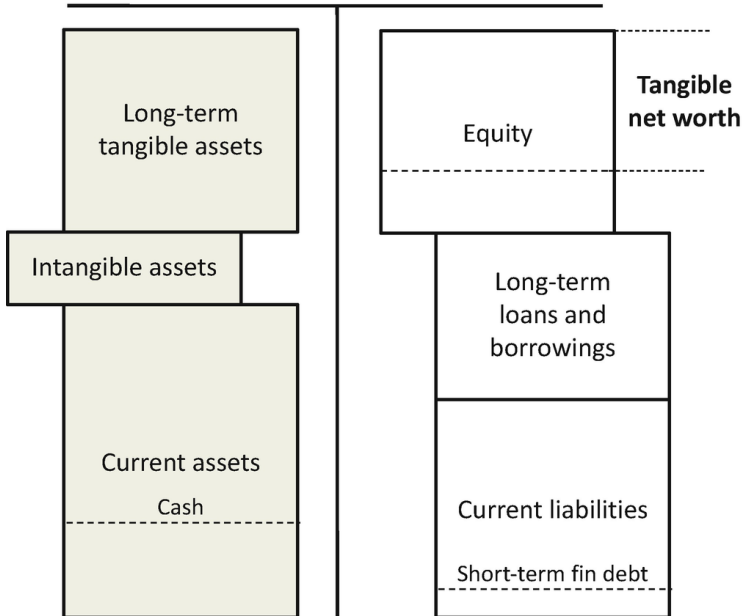


Fig. 3.4Company Alpha outlined

### 3.4.2 The Grey Scenario

Beta, a company showing a low liquidity and a high solvency.  
Table 3.6 lists the simplified balance sheet for company Beta.

Table 3.6Company Beta’s balance sheet

Assets (in \$1000)	Equity and liabilities	Year X	
Fixed assets (net)			
Long-term assets			
Current assets (non-core assets)			
Long-term taxes payable			
Accounts receivable			
Prepaid expenses			
Financial debt			
Cash (operating)			
Total			

### Liquidity Ratios

Table 3.7 provides an overview of the liquidity ratios.

Table 3.7Company Beta’s liquidity ratios


Liquidity ratios	Company Beta	
Cash ratio	0.08	OK
QSR	0.6	OK
QSR	0.6	OK
Cash ratio	0.08	OK

Detailed calculations for Beta’s cash ratio and working capital

- Cash ratio =  $50 / (300 + 100 + 50 + 150) = 50 / 600 = 0.08$
- NCWC from operations =  $150 + 250 + 50 - (300 + 100 + 50) = \$0$

## Solvency Ratios

Table 3.8 provides an overview of the solvency metrics.

Table 3.8 Company Beta’s solvency metrics

Solvency (in \$1000)	Company Beta	
Net debt/equity	0.27	OK
Net debt	200	OK
Net worth	1400	OK
Equities/total assets	0.6	OK
Tangible net worth/assets	0.6	OK

Detailed Beta’s net debt and net worth calculations

- Net debt (using surplus cash only) = debt – surplus cash  
=  $200 - 0 = 200$  (i.e., net debt/equity = **27%**)
- Net debt = debt – overall cash =  $200 - 50 = 150$   
(i.e., net debt/equity = **20%**)
- Net worth =  $1400 - (1400 - 750) = \$750,000 >> 0$
- Tangible net worth =  $(1400 - 150) - (1400 - 750) = \$600,000 >> 0$

A liquidity crisis can be resolved if company Beta remains solvent and holds some disposable and valuable assets. For example, long-term investments in the form of shares (which are, in this specific case, non-strategic) could be sold. Some of the short-term debt could be converted into long-term debt (i.e., in successful negotiations with banks).

If these investments were sold at book value and if \$100,000 of the short-term financial debt were converted into long-term debt (debt restructuring), the liquidity would become optimal, with the cash ratio increasing from 0.08 to 0.6, a solid level.

The adjusted liquidity ratios are as follows (Table 3.9):

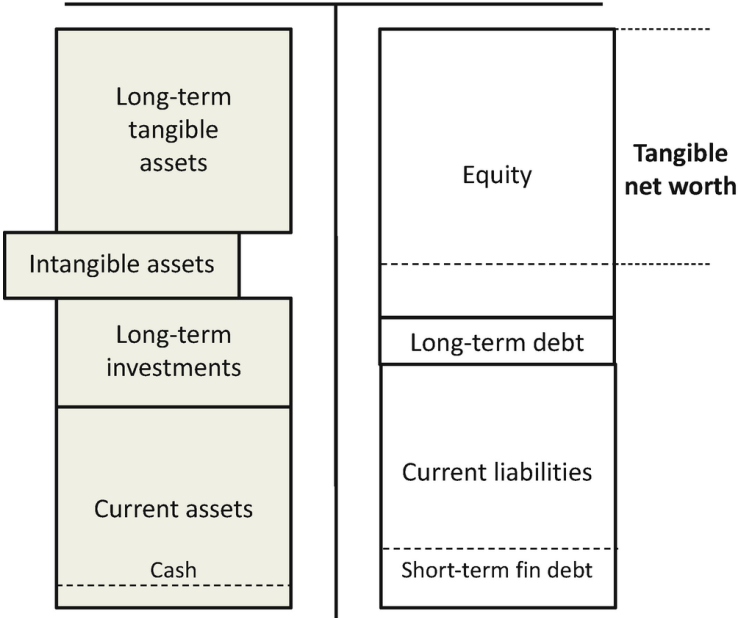
Table 3.9 Adjustments to company Beta’s liquidity ratios


Liquidity ratios	Beta after sale and conversion	
Current ratio		
Quick ratio		
Cash ratio		

*Detailed calculations for Beta’s adjusted liquidity ratios*

- Adjusted current ratio =  $(150 + 250 + 50 + 50 + 250)/(300 + 100 + 50 + 150 - 100) = 750/500 = 1.5$
- Adjusted quick ratio =  $(250 + 50 + 50 + 250)/(300 + 100 + 50 + 150 - 100) = 600/500 = 1.2$
- Adjusted cash ratio =  $(50 + 250)/(300 + 100 + 50 + 150 - 100) = 300/500 = 0.6$

Company Beta is short on cash, but the company remains solvent as illustrated below (Fig. 3.5).



**Fig. 3.5**Company Beta outlined

### 3.4.3 The Worst-Case Scenario

Epsilon is a company showing a good apparent liquidity and a negative solvency.

Table 3.10 details the simplified balance sheet of company Epsilon.

Table 3.10Company Epsilon’s balance sheet

Assets	Equity and liabilities	Year X	
Fixed assets (net)			
Current assets			
Accounts payable			
Accounts taxes payable			
Accounts receivable			
Prepaid expenses			
Financial debt (incl. CPLTD)			
Cash and MS			
Total			

# Liquidity Ratios

Table 3.11 provides an overview of the liquidity ratios.

Table 3.11Company Epsilon’s liquidity ratios

Liquidity ratios	Company Epsilon	
Cash ratio		
QCRatio		
Cash ratio OK		

Detailed calculations for Epsilon’s cash ratio and working capital

- Cash ratio =  $100 / (200 + 100 + 300) = 100 / 600 = 0.17$
- NCWC from operations =  $350 + 250 + 150 - (200 + 100) = \$450,000$  (needs to be financed)

The overall liquidity for company Epsilon appears satisfactory, but its cash ratio is low. Its operational liquidity is lower than it looks at first because its prepaid expenses (prepaid rent and insurance) cannot be transformed into cash. Inventories, the weakest component of all current assets, dominate. Now we must ask if they are convertible into cash at this value?

The adjusted liquidity ratios excluding prepaid expenses are as follows (Table 3.12).

Table 3.12Company Epsilon’s operating liquidity ratios

Adjusted liquidity ratios	Company Epsilon	
Cash ratio		
QCRatio		
Cash ratio OK		

Detailed calculations for Epsilon’s adjusted liquidity ratios

- Adjusted current ratio =  $(350 + 250 + 100)/(200 + 100 + 300) = 700/600 = 1.17$
- Adjusted quick ratio =  $(250 + 100)/(200 + 100 + 300) = 350/600 = 0.58$

Solvency Ratios

Table 3.13 provides an overview of the solvency metrics.

Table 3.13Company Epsilon’s solvency metrics

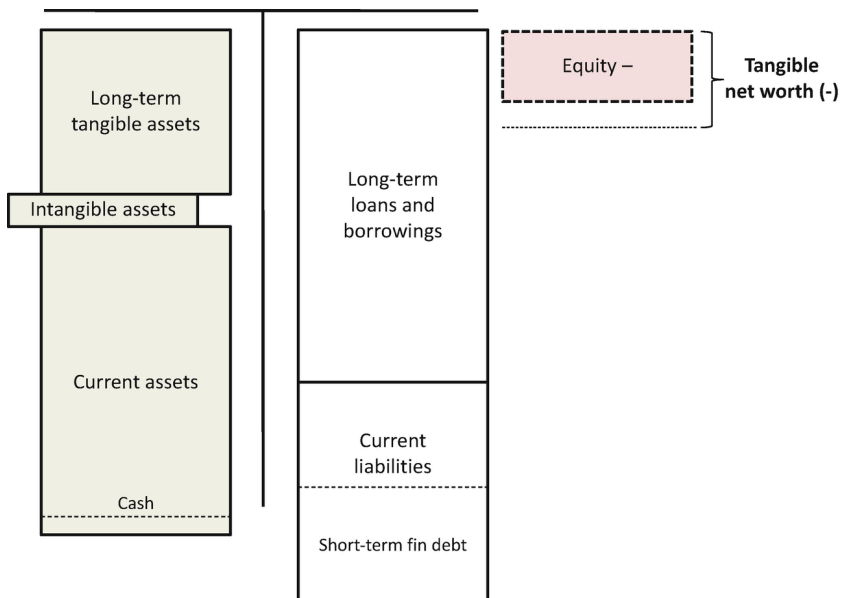
Solvency (in \$1000)	Company Epsilon	
Net debt/equity		
Net worth		
Tangible net worth		
Total assets		
Total debts		

Epsilon’s net debt and net worth calculations are outlined below:

- Net debt = debt – cash = 1300 – 100  
= \$1,200,000 (i.e., net debt/equity = –600%)
- Net worth = 1400 – [1400 – (–200)] = –\$200,000 << 0
- Tangible net worth = (1400 – 50) – [1400 – (–200)]  
= –\$250,000 << 0

Company Epsilon is not creditworthy as illustrated below (Fig. 3.6):





**Fig. 3.6**Company Epsilon outlined

## ***Solvency at Its Worst!***

A company with a good liquidity position can survive for a certain amount of time. It will eventually go under if its profitability and cash creation are not high enough to cover operating costs and service debt obligations.

Company Epsilon is not viable over the long-term as the company is drowning in a sea of debt with no equity.

However, should its debt hide a major loan from shareholders , the nature of this debt would not be as “lethal” as securitized loans from commercial banks. This type of loan has an equity-like status.

One additional step that must be taken is to uncover the nature of these fixed assets, in order to estimate their market value. For example, a piece of land or a building, well-positioned in the city center, is not comparable to old machinery or a decaying warehouse. Historical prices differ significantly from market prices, to both the benefit and detriment of a company’s balance sheet.

Insolvency is a serious problem to tackle and often heavy restructuring is necessary, if possible. Addressing this issue requires time and a high business acumen (often scarce resources).

# 3.5 Key Takeaways on Liquidity Plus Solvency Ratios and Their Limitations

Here are the main liquidity and solvency metrics (Tables 3.14 and 3.15):

Table 3.14 Liquidity ratios

Current assets/current liabilities >> 1	
Quick ratio (current assets - inventory)/current liabilities → 1	
Cash ratio (cash equivalents/current liabilities >> 0.5	

Table 3.15 Solvency metrics

Equity/capital/assets >> 20%	
Total tangible assets >> total liabilities	
Market value of assets >> total liabilities	

## Limitations

- Companies with large negative non-cash working capital (low inventory and/or receivables and large payables) can withstand lower cash ratios (e.g., retail, airlines, services, restaurants)
- Quality of inventory: How old is the inventory, and is it still usable in the production chain or sealable (e.g., finished products)? Is the inventory properly depreciated or written off (obsolete stock) when required? What is the percentage taken up by work-in-process inventory, the less valuable item?
- Quality of accounts receivable: How much is past due? Is there an available accounts receivable aging report? Do the receivables stem from creditworthy customers?
- For a complete solvency analysis, financial leverage and off balance sheet obligations need to be closely monitored.

Remember that the provided limits are rules of thumb and will differ by sector. Thus, it is important to check trends and competitors.

# References and Further Reading

Anthony, Robert N., and James S. Reece. 1989. *Accounting: Text and Cases*. Irwin.

Coulon, Yannick, January 2017, Guide pratique de la finance d'entreprise, Gualino.  
———. September 2018, L'essentiel des ratios financiers, Maxima Laurent du Mesnil.

Quiry, Pascal, and Yann Le Fur. 2019. *Finance d'entreprise 2020 de Pierre Vernimmen*. Dalloz.

Stowe, John D., Thomas R. Robinson, Jerald E. Pinto, and Dennis W. McLeavey. August 2002. *Analysis of Equity Investments: Valuation*. AIMR and CFA Institute.

Thibierge, Christophe. November 2013. *Comprendre toute la finance*, 2ème édition. Vuibert.

Walsh, Ciaran. 2008. *Key Management Ratios*, 4th ed. Financial Times Series. FT Prentice Hall. Pearson Education Limited.

## 4. Debt Ratios

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### **Abstract**

Debt, as much as an opportunity as a threat, must be monitored.

First, financial leverage and its effects on income, both positive and negative, must be defined.

The core of the chapter focuses on debt ratios by comparing the relative size of debt to equity on the balance sheet, or by comparing the relative size of debt or its repayment to the cash flows generated by the company.

Two case studies illustrate the limits of the classic debt to equity approach based on book value.

Excessive financial leverage is then addressed via the instability theory of the late professor Hyman P. Minsky.

Finally, a sample of large players in three sectors is displayed to show that debt levels are sector related.

Key takeaways on debt ratios and their limitations conclude the chapter.

**Keywords** Financial leverage Debt to equity ratios Debt coverage ratios Financial instability hypothesis of professor Hyman P. Minsky Creditworthiness

## 4.1 Introduction on Indebtedness

Debt, as much as an opportunity as a threat, must be monitored. The company financing mix between debt and equity must be optimal (i.e., trade-off between the low after-tax cost of repayable loans versus the high cost of stable and permanent equity).

There is an inherent conflict of interest between lenders and equity holders. Additional borrowing enhances shareholder profitability, but it represents a risk for lenders as they become more exposed without benefiting from the additional return. Therefore, there is a limit beyond which lenders will not further finance the expansion of a company.

### ***Measuring the Level of Financial Debt***

The indebtedness of a company can be measured in two complimentary ways:

- We compare the relative size of debt to equity on the balance sheet ; that is the *static approach* for debt to equity ratios . Here, we use the debt to equity, gearing or leverage ratios.
- We compare the relative size of debt or its repayment/service to the cash generated by the company; this is the *dynamic approach* for debt coverage ratios .

But first, financial leverage and its effects on income, both positive and negative, must be defined.

## **4.2 Financial Leverage**

Let us observe three comparable companies  $\alpha$ ,  $\beta$  and  $\delta$  with different capital and financing structures.

The companies share the following common features:

- Operating assets (OA) = 100
- Amortization and depreciation = 5%/year  $\times$  OA
- EBIT = 12; ROCE = 12% (before tax)
- Tax rate = 25%

However, the interest rates differ between company  $\beta$  and  $\delta$  as each company presents a different level of risk: 3% (company  $\beta$ ) versus 4% (company  $\delta$ ).

Figure 4.1 shows the net income calculations for the three companies.

## Financial leverage

Company α		Company β		Company δ	
OA = 100	Equity = 100	OA = 100	Equity = 50 Debt = 50	OA = 100	Equity = 20 Debt = 80

ROCE (return on capital employed)

$$= 12 / 100 = 12\%$$

$$✓ \text{ Net income } \alpha = [12 - (5\% \times 100)] \times (1 - 25\%) = 5.25$$

$$\text{ROE } (\alpha) = 5.25 / 100 = 5.25\%$$

$$✓ \text{ Net income } \beta = [(12 - (5\% \times 100) - (3\% \times 50))] \times (1 - 25\%) = 4.125$$

$$\text{ROE } (\beta) = 4.125 / 50 = 8.25\%$$

$$✓ \text{ Net income } \delta = [(12 - (5\% \times 100) - (4\% \times 80))] \times (1 - 25\%) = 2.85$$

$$\text{ROE } (\delta) = 2.85 / 20 = 14.25\%$$

**Fig. 4.1** Financial leverage with positive effects

As we can see above, each company's net income is magnified by its level of debt, and shareholders of company δ are rewarded with a "generous" return on equity (ROE) of 14.25%.

The multiplication of gains and LOSSES

The leverage effect works both ways. If the return on capital employed (ROCE) **drops from 12% to 5%**, the effect is devastating for the two companies carrying debt. The loss will be multiplied (or the gain strongly reduced), and the ROE will sink to – 16% for company δ.

Figure 4.2 shows the adjusted net income calculations for the three companies under the new scenario.

## Financial leverage

Company $\alpha$		Company $\beta$		Company $\delta$	
OA = 100	Equity = 100	OA = 100	Equity = 50 Debt = 50	OA = 100	Equity = 20 Debt = 80

ROCE (return on capital employed)  
 $= 5 / 100 = 5\%$

✓ Net income  $\alpha = 5 - (5\% \times 100) = 0$   
 ROE ( $\alpha$ )  $= 0 / 100 = 0\%$

✓ Net income  $\beta = 5 - (5\% \times 100) - (3\% \times 50) = -1.5$   
 ROE ( $\beta$ )  $= -1.5 / 50 = -3\%$

✓ Net income  $\delta = 5 - (5\% \times 100) - (4\% \times 80) = -3.2$   
 ROE ( $\delta$ )  $= -3.2 / 20 = -16\%$

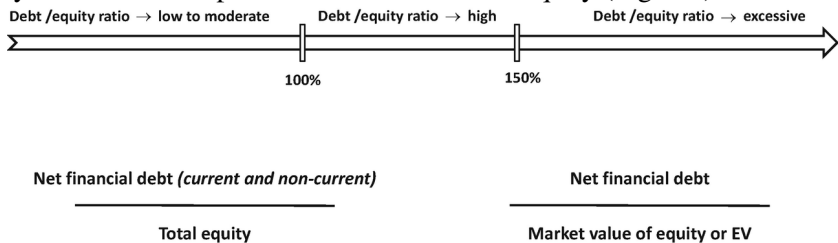
**Fig. 4.2** Financial leverage with negative effects

A highly leveraged company becomes very profitable in times of sales growth but vulnerable in times of recession. Debt servicing is a fixed-cost outflow, whatever the level of revenue or profit.

*Reminder:* Financial leverage is not to be confused with operating leverage, that is, the relative importance of fixed costs versus variable costs and its multiplying effect on operating income, see break-even analysis.

## 4.3 Debt to Equity Ratios

The main debt ratios following a static approach are presented below, and they establish a comparison between debt and equity (Fig. 4.3).



Reminder: The absolute ratio number is industry-specific, the trend is the key!

### **Fig. 4.3** Debt to equity ratios

*Net financial debt* = interest – bearing debt or financial obligations (e.g., long and short – term bank loans, bonds, lease c

Total equity = equity + minority interest or *NCI* (for consolidated balance sheets)

Both “net debt/market cap” and “net debt/EV ” are state of the art ratios, meaning they are market-driven and not accounting-driven metrics.

A conservative approach is to include all lease obligations (i.e., capital and operating) in the debt section as the differences between the two lease contracts are complex and somewhat arbitrary. Since 2019, operating lease obligations are recorded and capitalized as liabilities on balance sheets, under International Accounting Standards Board (IASB) new standards (i.e., liability value = PV of future lease expenses). This helps in comprehensive leverage calculation. Balance sheets increase in size as a consequence (huge impact on EV).

There are as many debt ratios as there are definitions of “net financial debt ” or “equity.” It is possible to restrict the definition of financial debt to long-term debt only (excluding short-term banking facilities) or to banking debt only (excluding loans from shareholders).

Financial leverage can be measured by the “debt/equity” ratio or by the equity multiplier (total assets or capital employed /equity). The equity multiplier is used in the DuPont equation (ROE ), see Chap. 5.

#### ***For Private Companies***

Loans from shareholders (credit) can represent massive amounts and should be deducted from total financial debt, as there is generally no fixed repayment schedule attached to this unsecured debt category. These shareholder loans, in credit, have a “quasi” equity status, as their owners are the shareholders of the company. Therefore, they will demonstrate flexibility before withdrawing their capital and liquidating a company in which they have invested.

## **4.4 Debt Coverage Ratios**

We now look at the relative size of the company’s cash flow against its debt obligations or debt load (Fig. 4.4).



## Debt coverage ratios: cash availability to debt servicing

$$\frac{\text{EBITDA (EBIT)}}{\text{Annual debt service or obligations}}$$

>> 2

**Debt Service Coverage Ratio (DSCR)**  
Operating cash (EBITDA) should cover current debt servicing plus additional cash for investments, dividends and a safety margin. EBITDA >> 2 x debt service. (EBIT >> 1.5 debt service)

$$\frac{\text{EBIT (EBITDA)}}{\text{Annual interest expense}}$$

>> 3

**Interest Coverage Ratio (ICR)**  
EBIT should be at least three times larger than interest expense.  
Interest should account for less than 1/3 of EBIT in a low interest rate environment (or 20% of EBITDA or EBITDA >> 5 x Int exp)

$$\frac{\text{Net debt}}{\text{EBITDA}}$$

<< 5

Net debt should not account for more than five years of operating cash. EBITDA should account for more than 20% of net debt.

Reminder: The absolute ratio number is industry-specific, the trend is the key!  
EBIT, EBITDA, EBITDA – Capex or estimated free cash flows are possible

**Fig. 4.4** Debt coverage ratios

### Reminder

Financial obligations include lease obligations; Earnings before Interest, Taxes, Depreciation and Amortization (EBITDA) is equivalent to operating income plus depreciation and amortization.

When using EBITDA as a proxy for operating cash, we must keep in mind that new investments are to be financed along with debt servicing. Consequently, an adjusted debt coverage ratio using “EBITDA —CAPEX” or FCFE (i.e., free cash flow to the firm) may be relevant for capital intensive companies.

As a proxy for the free cash flow generated by the company, it is possible to use the following simplified formula (instead of using EBIT or EBITDA ):

$$\text{Free cash flow (estimated)} = \text{net income} + \text{non-cash expenses} - \text{non-cash revenues}$$

The typical non-cash expenses are depreciation and amortization.

A significant non-cash revenue can be a reversal (write back) of excess provisions.

### ***ICR and DSCR Are Complementary***

Most loans are capital repayment loans; and therefore, debt service (i.e., loan repayment = principal + interests) is more important for evaluation than just plain interest expenses, especially in a low interest rate environment.

*Let us consider company ABC in the following example:*

Company ABC generates an EBITDA of \$100,000. It has a record debt of \$500,000. The debt is a ten-year loan with a yearly payment schedule (debt service) of principal \$50,000 + interest exp. \$15,000.

- Debt/EBITDA:  $\$500,000 = 5 \times \text{EBITDA}$  (high level of debt)
- DSCR =  $100,000 / (50,000 + 15,000) = 1.54 < 2$  (coverage too low, should be over 2)
- ICR =  $100,000 / 15,000 = 6.7 \text{ times } (>5)$

The ICR should not be used alone as interest expenses can hide a low interest rate of a long-term secured loan (here at 3%) or a very high interest rate from an unsecured, unauthorized overdraft.

This company has only \$35,000 of available cash to pay for investments, increases in non-cash working capital, dividends and bad surprises. It has too much debt and no safety margin.

There is a conflict of interest between lenders and borrowers. The former prefers profitable, safer short-term loans; the latter prefers long-term borrowings preserving cash flows.

Many textbooks indicate lower limits. Experienced managers however know that a negative exceptional item is very often followed by another negative exceptional item, year after year, until finally, exceptional items tend to become recurring items! Thus, it is important to know how to be conservative with cash management and sets higher safety limits to plan for any mishap that either may or will happen. Exceptional items are not so “exceptional” after all.

Plan for the worst, achieve the best!

# 4.5 Debt Ratios Using Enterprise Value

Ratios linking debt to enterprise value (EV) are state of the art ratios, meaning they are market-driven and not accounting-driven metrics.

The normative rule “net D << fair market value of equity or market capitalization” is mathematically equivalent to the four following rules 1, 2, 3 and 4

*Let us do the Math:*

Net debt << market capitalization

Net debt/market capitalization << market capitalization/market capitalization

Rule 1: Net Debt/market capitalization << 100%

Net debt << market capitalization

$(EV - \text{market capitalization}) << \text{market capitalization}$

$EV << 2 \text{ market capitalization}$

$EV/2 << 2 \text{ market capitalization}/2$

$EV/2 << \text{market capitalization}$

Rule 2: Market capitalization >> 50% EV

Net debt << market capitalization

50% net debt << 50% market capitalization

Net debt – 50% net debt << 50% market capitalization

Net debt << 50% net debt + 50% market capitalization

Net debt << 50% (net debt + market capitalization)

Net debt << 50% EV

Rule 3: Net Debt/EV << 50%

Net debt << market capitalization

Net debt + market capitalization << market capitalization + market capitalization

$EV << 2 \text{ market capitalization}$

EV/market capitalization << 2 market capitalization/market capitalization

Rule 4: EV/market capitalization << 200%

Fair market value of equity (or market cap) can replace the book value of equity if the market is efficient and the value is fairly appraised and reliable. Both valuation methods (book and market value) are complimentary.

# 4.6 Limitations of Debt to Equity Ratio

## Book Value and Fair Market Value

One of the main issues with ratios using the balance sheet as a reference point is the disconnect that exists between historical or booking values and fair market values. The debt to equity ratio is no exception to that rule. Many open questions remain on the valuation of non-current or current assets and consequently on equity. Cash and debt are less problematic as shown below (Fig. 4.5).

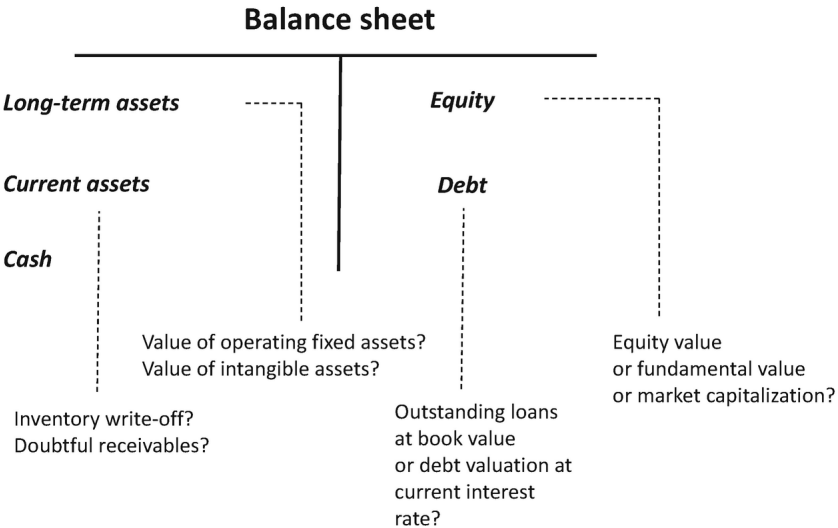


Fig. 4.5 Many open questions on balance sheet valuations

# 4.6.1 Companies with Negative Equity

The market value of equity may differ significantly from the owner’s equity listed on the balance sheet . Consequently, any debt leverage analysis based on this accounting data can be misleading. In this case, the market value of equity and the enterprise value replace the owner’s equity favorably by adding a touch of reality and, hopefully, foresight as well.

However, let us remain conservative and prudent: the value of non-quoted companies is extremely difficult to determine, it is more an art than an exact science.

## Example: Company Libertee

Let us consider company “Libertee” with the following simplified balance sheet (Table 4.1):

Table 4.1Company Libertee’s balance sheet

Libertee (in \$1000), book value			
200Property, Plant and Equipment (PP&E) net			
100Intangible assets			
100Current liabilities (operating)			
500plus cash			
700Total liabilities and equity			

We reorganize its operating assets as seen below (Table 4.2):

Table 4.2Company Libertee’s balance sheet showing net operating assets

Libertee (in \$1000), book value			
800Net operating assets			
500plus cash			
700Total liabilities and equity			

Operating assets include operating fixed assets, operating non-cash working capital and operating cash.

*Net operating assets* = 700 + 100 + 100 – 100 = \$800, 000

With negative equity, the leverage ratio (net debt to equity) does not make any sense (i.e., net debt to equity = –9), and no additional debt seems possible.

Company Libertee recently went through an extensive restructuring and now generates a recurring EBITDA of \$200,000 per year. Within the

sector, its operating assets are valued ten times its EBITDA . Using this market valuation, the balance sheet could therefore be updated in the following way (Table 4.3):

**Table 4.3**Company Libertee’s balance sheet at fair market value

Libertee at fair market value (in \$1000)			
2000	Net operating assets		
1000	plus cash		
2100	Total liabilities and equity		

*The updated balance sheet was constructed using the elements below:*

- EV = net operating assets at fair market value
- EV = 200,000 × 10 = \$2,000,000
- Total assets = 2,000,000 + 100,000 = \$2,100,000

Total assets = total equity + liabilities = \$2,100,000

Total equity + liabilities = equity at market value + 1,000,000 = \$2,100,000

Therefore, equity at market value = 2,100,000 – 1,000,000 = \$1,100,000

Equity at market value >> owner’s equity (book value)

The owner’s equity largely reflects history. It does not take into consideration the successful current restructuring the company is going through. Furthermore, a market value estimation should be based on future earnings and not on past earnings.

Enterprise value calculation:

$$EV = \text{equity at market value} + \textit{net debt} \text{ (debt – surplus cash)}$$

$$EV = 1100,000 + (1000,000 - 100,000) = \$2000,000$$

*Company Libertee’s debt ratios using market value*

Leverage (Equity) = net debt/equity at market value

$$\text{Leverage (Equity)} = (1,000,000 - 100,000)/1,100,000 = 0.82 < 1$$

Leverage (EV ) = net debt/EV

$$\text{Leverage (EV )} = (1,000,000 - 100,000)/2,000,000 = 0.45 < 0.5$$

The two market-related ratios are satisfactory; thus, the debt looks high but still manageable.

Ratios based on accounting data are always necessary but often insufficient. One must go beyond static analysis and incorporate market and cash flow data in order to create a complete view of debt leverage.

## 4.6.2 Companies with Large Real Estate Holdings

The net debt to equity ratio is poorly suited for companies whose assets include a large real estate component. The risk taken by the lender on real estate is reduced, as he benefits from a mortgage on “solid” assets. This value is less volatile and abstract than that of intangibles or operating assets . Properties ensure predictable revenues and therefore safety.

It is not uncommon to find long-term real estate financing that covers 100% of property value. Operating asset financing is more restrictive in terms of duration (8–10 years) and loan to value (usually 50% to 70%).

Let us take the case of a company with a mixed structure, including real estate and operating assets.

The balance sheet of the Mixed Company is shown below (Table 4.4):

Table 4.4Mixed Company’s balance sheet

Assets (in \$)	Equity and liabilities		
100,000	Equity		
169,000	Buildings and technical installations		
95,000	Due payable		
90,000	Due taxes payable		
50,000	Due receivable		
45,000	Due marketable securities (MS)		
700,000			

### Operating versus non-operating assets

- Buildings and technical installations (\$169,000) = Buildings (\$95,000) + technical installations (\$74,000)
- Cash and MS (\$145,000) = operating cash (\$95,000) + marketable securities as non-core assets (\$50,000)

The simplified income statement of the Mixed Company is as follows (Table 4.5):

Table 4.5Mixed Company’s income statement

Mixed Company (in \$)	Year X

<del>EBITDA</del>	
<del>Depreciation and amortization</del>	
<del>EBITDA (operating income)</del>	
<del>Interest expenses</del>	
<del>10,500 (25%)</del>	
<del>Net income</del>	

The principal repayment (Mixed Company) reaches \$34,000 for the current year.

Table 4.6 gives an overview of the Mixed Company’s leverage ratios.

**Table 4.6**Mixed Company’s debt ratios

Financial leverage ratios (in \$)	Mixed Company
<del>Debt</del>	
<del>Equity</del>	
Debt/equity (net debt/equity)	
DSCR (EBITDA/debt service)	
ICR (EBIT/interest exp)	

*Detailed DSCR and ICR calculations*

- DSCR = EBITDA /debt service = \$70,000/ (\$8000 + \$34,000) = **1.67** < 2
- ICR = EBIT /interest expense = \$50,000/\$8000 = **6.25** > 3

In the above example, the leverage ratio of net debt to equity looks out of control (375% >> 100%). However, the situation is not as alarming as this ratio implies.

The two following complex methods illustrate that this ratio alone is too weak to support any conclusion about the overall debt situation.

# 1st Method: Separating Real Property from Operating Assets when Analyzing Debt Leverage

The key is to obtain a debt leverage ratio that is linked exclusively to operating assets. Land and real estate, and their associated debts, are extracted from the “Operating Company” and transferred to a new fictitious investment company. EBITDA is adjusted accordingly by an annual rent paid to that new investment entity (–\$36,000 under a standard rental contract). \$385,000 of the company’s long-term debt is written off from its



operating liabilities.

Long-term debt transferred = loans for the land + loans for the buildings = \$290,000 + \$95,000 = \$385,000.

The new situation is as follows (Tables 4.7 and 4.8):

Table 4.7Operating Company’s balance sheet

Shareholders' equity	Liabilities		
Land			
Buildings			
Accounts payable			
Notes payable			
Accrued taxes payable			
Accounts receivable			
Deferred MS			
Total			

Table 4.8Operating Company’s income statement

Operating Company (in \$)	Year X
Revenue	
Depreciation and amortization	
Cost of sales	
Interest expenses	
Taxes (25%)	
Net income	

The principal repayment (Operating Company) reaches \$4500 for the current year (Table 4.9).

Table 4.9Operating Company’s debt ratios

Financial leverage ratios	Operating Company	
Debt		
Net debt		
Leverage (net debt/equity)		
Debt/EBITDA/debt service)		
Debt/EBIT/interest exp)		

## Negative Net Debt and Its Meaning

A negative “net debt (–)/equity (+)” indicates that the company is in good financial health and a negative “net debt (+)/equity (–)” implies that the company is insolvent. The ratio is favorable with a negative numerator and unfavorable with a negative denominator. The case in which both

numerator and denominator are negative (i.e., leading to a positive ratio) are improbable, given that negative equity is often linked with a high level of debt.

*Detailed DSCR and ICR calculations*

- EBITDA/debt service =  $\$34,000/(\$2000 + \$4500) = 5.23 >> 2$
- EBIT /interest expense =  $\$30,300/\$2000 = 15.15 >> 3$

Following the above calculations, the Operating Company looks financially sound.

The investment company, not studied in this example, has the profile of a normal and creditworthy real estate company where “rents > loan installments.”

## 2nd Method: Using Non-Core Assets and Enterprise Value

Let us take the original “Mixed Company” with operating assets as a separate asset line (Table 4.10).

**Table 4.10**Mixed Company’s balance sheet showing net operating and non-core assets

Mixed Company (book value, in \$)			
Net operating assets			
Non-core assets (land, buildings and MS)			
Employees			

Net operating assets =  $\$74,000 + \$33,000 + \$8000 + \$55,000 + \$95,000 - \$30,000 - \$80,000 - \$65,000 = \$90,000$

The remaining assets are considered to be non-core assets.

Non-core assets =  $\$290,000 + \$95,000 + \$50,000 = \$435,000$  (land, buildings and excess cash , here MS)

When book value is used, the debt leverage appears low.

Net debt/equity (book value) =  $(445,000 - 435,000)/80,000 = 12.5\% << 100\%$

We now use market valuation to analyze the debt situation.

Hypothesis: The fair market value of the operating assets is estimated to be 10x normalized EBITDA (valuation norm in the sector).

Fair market value of operating assets (EV ) =  $34,000 \times 10 = \$340,000$

\$34,000 was calculated in the previous section of the case. It is the adjusted EBITDA generated by operating assets , net of properties and

land.

A comparable company was recently sold at \$400,000. This company had a cash position equivalent to its debt.

Market value of equity = EV – net debt = EV = \$400,000 > \$340,000

Thus, using \$340,000 as an estimation for the Mixed Company’s EV seems to be a conservative and valid approach. It will reinforce the ratio quality and reliability.

See Table 4.11 with the Mixed Company valued at market price:

Table 4.11Original Mixed Company at market value

Mixed Company (market value, in \$)		
Operating assets (EV value × EBITDA)		
Net debt		
Fair market value		

The calculation for the fair market value of equity is displayed below:

- EV = operating assets = equity + net debt (at fair value)
- Therefore, equity = operating assets – net debt (at fair value)
- Net debt = debt – non-core assets
- Net debt = 445,000 – 435,000 = \$10,000
- Fair value of equity = 340,000 – 10,000 = **\$330,000**

Assumption taken for land and real estate (non-core assets ): book value = market value.

The adjusted debt situation appears as follows (Table 4.12):

Table 4.12Original Mixed Company with adjusted debt ratios

Financial leverage ratios (in \$)	Mixed Company	
Net debt		
EV/100% (net debt/equity at fair market value)		
Operating assets financed thru debt		

The above calculations show us that net debt represents only 3% of the market value of equity and less than 3% of the mark-to-market operating assets (enterprise value ), which is an extremely low (negligible) level.

When debt is measured, we must establish a hierarchy between debt financing for durable and highly valuable assets such as land or property, and debt financing for short-term, decaying, intangible or quickly depreciating assets such as inventory or equipment (i.e., general operating assets ). The former debt is secured, cost effective and stable;

the latter can be volatile and costly.

## 4.7 Debt and Industries

There are huge differences between sectors that depend on the amounts of capital expenditure (capex) needed. For instance, the car and utilities industries require massive investments, and therefore massive debt (capital intensive sectors).

This is obvious in the car industry where the sector faces major challenges such as mobility (driverless or autonomous), electrification (including the battery issue) and intense competition.

E-commerce companies such as Amazon or Alibaba have negative debt, meaning that they have higher cash holdings than outstanding debt.

Table 4.13 shows a sample of large players in three sectors:

**Table 4.13**Debt ratios of key companies in three sectors

<b>Wegmann</b>			
58%debt/total equity			
<b>National Grid</b>			
121%debt/total equity			
<b>BMW</b>			
121%debt/total equity			

There are general sector differences but also specific company differences within sectors.

A company carrying a negative debt may be the consequence of an extremely high profitability, but it may also be the result of substantial underinvestment. Underinvestment and overinvestment are both detrimental to the financial health of a company, the former may weaken the long-term generation of EBITDA (low competitiveness), the latter may weaken the capital structure (high financial leverage) and cash generation (high debt service). The right balance between must be struck. See the proposed merger between PSA and FCA which allows investment spreading across the two entities (Nov. 2019).

### **Formula Used**

Net debt/total equity ratio = (short + long-term financial debt – total cash)/total equity (incl. Non-controlling interest ), errors and omissions excepted.

The balance sheet references are quoted at the end of the chapter.

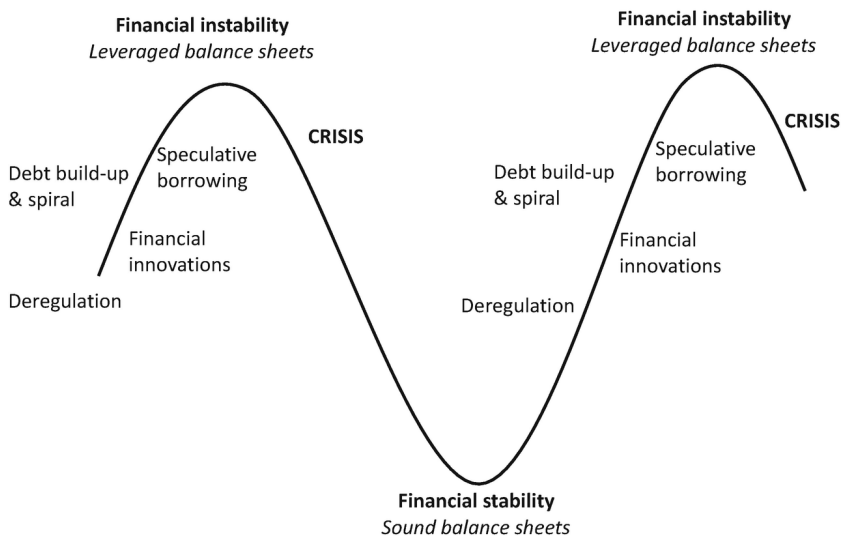
## 4.8 Financial Instability

The economist Hyman P. Minsky, a disciple of John Maynard Keynes, famously theorized the sub-prime and [dot.com](#) crises long before they arrived, known as the theory, or hypothesis, of financial instability. Here, the economy cannot find equilibrium between supply and demand, instead drifting dangerously toward excessive “financialization” of the economy, leading to excessive financial leverage . Prosperity and optimism encourage supervisory boards and authorities to reduce judicious regulations put in place for just this purpose.

This is particularly obvious in the USA, where the history of the Glass-Steagall Act is a case in point. How quickly the lessons of the past are forgotten! Instead, the same old tune plays: “this time, it is different.” Unfortunately, excessive leverage will always turn against the borrower and subsequently the lender.

Easy and lenient access to credit drives up asset prices and increases financial leverage . The search for ever more financial profitability accelerates this movement. A “wealth effect” boosts balance sheets and artificially intensifies solvency . This easy access to credit is also the result of ever more innovative financial solutions. Finally, financial orthodoxy gradually gives way to “oversized” balance sheets.

This economic view of Professor Minsky is corroborated by behavioral finance and the study of financial crises. A financial bubble is always accompanied by massive over-indebtedness and the “speculative irrationality” of economic agents, as shown below in Fig. [4.6](#).

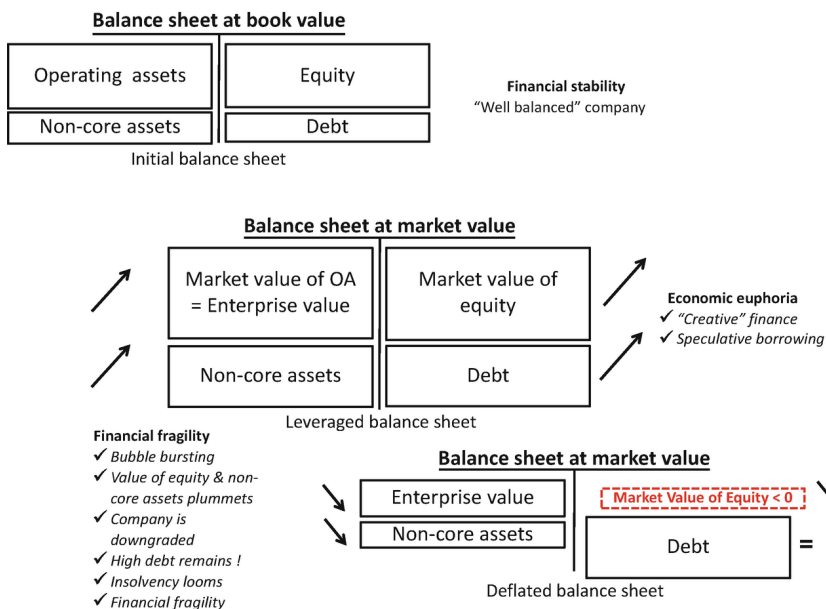


**Fig. 4.6** From stability to instability

### ***The End of the Virtuous Cycle***

When financial “fragility” is reached, one simple negative event is enough to trigger a downward spiral. Worse, a highly leveraged company cannot survive a steady decline in the value of its assets or the cash flow it generates. The company will quickly become insolvent. If this is the case, a refinancing of its debt becomes challenging, if not impossible.

Figure 4.7 illustrates the evolution of a balance sheet from a stable to an unstable status.



**Fig. 4.7** Balance sheet instability

### **Best Practices**

The cautious attitude is to limit debt and use it in a controlled manner, even in periods of abnormally low or even negative rates such as today in the eurozone, Japan or Switzerland. There is an appropriate balance that must be struck. The problem is not so much related to financial expenses from long-term fixed-rate loans, as these interest rates have remained favorable in recent years. This issue comes from the fact that most loans to companies are short-term variable rate based that may or may not be renewed. Refinancing becomes a major risk in times of economic turmoil, especially for a company with a downgraded balance sheet. Even with long-term loans at low interest rates, capital repayment is a fixed cash outflow, whatever the level of revenue and margin. Let us not be lured by this low interest rate environment, bad investments will remain bad investments.

This prudential rule of good management is as valid for companies as it is for states and governments. An overly indebted state no longer has room to maneuver and becomes vulnerable to external shocks.

The "gallery of horrors" of uncontrolled debt can include the following: financing administrative expenses by additional long-term debt, financing a domestic asset with debt denominated in a foreign currency or financing fixed assets with short-term debt.

The “good old” ratios therefore retain their relevance. Financial orthodoxy remains valid. Cash is king.

# 4.9 Key Takeaways on Debt Ratios and Their Limitations

Here are three key debt ratios necessary to measure a company’s creditworthiness in a low interest rate environment (Table 4.14):

Table 4.14Debt ratios

Shareholder equity/(debt – cash)/total equity < 1	
EBITDA/interest expense >> 3	
Net debt cash/EBITDA < 5	

### Limitations

- No conclusion can be drawn from just one debt ratio, a static analysis (using the balance sheet ) and a dynamic analysis (using cash flows) must always be conducted in parallel.
- Equity at book value may be misleading. EV or market capitalization can replace shareholder’s equity when markets are fairly valued.
- Cash can be replaced by non-core assets , including excess cash , if significant, fairly valued and reasonably liquid.
- If debt service data are available, DSCR provides a more comprehensive view than ICR (EBITDA /debt service >> 2).
- Current debt service (interest + principal) may be minimized during a specific year, so the next few years’ principal payments on the debt maturity (or redemption) schedule must be reviewed. Refinancing is a major credit risk.
- Debt service can be enhanced over time by a growing profitability and improved cost-efficiency; thus, a forward-looking cash analysis can be of great value for debt management.
- Careful attention should be given to off-balance-sheet obligations such as lease obligations or possible hidden liabilities.
- EBITDA is used as a proxy for operating cash flow, but it can be distorted by non-recurring/non-operating expenses or revenues. Normalizing adjustments may be required.
- An adjusted debt coverage ratio using “EBITDA —CAPEX ” or



FCFF may be relevant for capital intensive companies, real CAPEX needs are to be considered and are not always equivalent to depreciation and amortization expenses.

Remember that the provided limits are rules of thumb and will differ by sector. Thus, it is important to check trends and competitors.

## References and Further Reading

Anthony, Robert N., and James S. Reece. 1989. *Accounting: Text and Cases*. Irwin.

Coulon, Yannick. January 2017. *Guide pratique de la finance d'entreprise*.

Gualino.

———. September 2018. *L'essentiel des ratios financiers*. Maxima Laurent du Mesnil.

Jones, Bill, Terry Jones, Theo Kocken, and Ben Timlett. March 2016. (USA). *Boom, Bust, Boom*. TV Documentary.

Minsky, Hyman P. 2008. *Stabilizing an Unstable Economy*. McGraw-Hill.

Quiry, Pascal, and Yann Le Fur. 2019. *Finance d'entreprise 2020 de Pierre Vernimmen*. Dalloz.

Stowe, John D., Thomas R. Robinson, Jerald E. Pinto, and Dennis W. McLeavey. August 2002. *Analysis of Equity Investments: Valuation*. AIMR and CFA Institute.

Thibierge, Christophe. November 2013. *Comprendre toute la finance*, 2ème édition. Vuibert.

Walsh, Ciaran. 2008. *Key Management Ratios*, 4th ed. Financial Times Series. FT Prentice Hall. Pearson Education Limited.

## Debt and Industries: Balance Sheets Used

Carrefour, 2018 Full Year Results, February 28, 2019.

Duke Energy 2018 Annual Report, Transforming the Future, Feb 14, 2019.

Fiat Chrysler Automobiles (FCA), Semi-Annual Report (Ended June 30, 2019), July 31, 2019.

General Motors, Second Quarter Earnings 2019, August 1, 2019.

Groupe EDF, 2019 Half Year Results, July 26, 2019.

National Grid, Annual Report and Accounts 2018/19 (Year Ended March 31, 2019), May 16, 2019.

Target, Annual Report 2018 (Year Ended February 3, 2019), March 2019.

Volkswagen, Half-Yearly Financial Report (Ended June 30, 2019), July 25, 2019.

Walmart, 2019 Annual Report (Year Ended January 31, 2019), Defining the Future of Retail, April 23, 2019.

# 5. Profitability and Performance Ratios

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## Abstract

This chapter explores the concept of profitability by establishing a dichotomy between book-value based and market-value based ratios.

Market-value based profitability ratios, namely the P/E and enterprise value (EV) multiples, constitute the core of the chapter.

Two case studies expose the link that exists between operating performance, financial profitability and their risk component, financial leverage. The first case study concentrates on current market profitability ratios while the second presents forward-looking multiples.

Key takeaways on profitability ratios and their limitations conclude the chapter.

**Keywords** Return on Capital Employed (ROCE) Return on Equity (ROE) Price-to-earnings ratio Enterprise value (EV) multiples [EV to sales, EV to EBITDA (Earnings before Interest, Taxes, Depreciation and Amortization) or EV to EBIT (Earnings before Interest and Taxes)] Trailing and forward ratios

# 5.1 Book-Value Based Versus Market-Value Based Profitability Ratios

A profitability ratio or return establishes a relationship between an operating or financial profit and the capital engaged by the firm's investors. A margin measures an operating or financial performance against the sales revenue of the company.

We follow a differentiated approach between performance measurement based on accounting data and performance measurement based on market data to achieve ratio consistency.

The main profitability ratios are listed below (Fig. 5.1):

- Operating or profit margins , ROCE and ROE are book-value based metrics
- Dividend or earnings yields , enterprise value (EV) multiples and P/E ratio are market-value based metrics

Operating & profit margins  
ROCE & ROE



book-value based

Dividend & earnings yield  
EV Multiples, P/E & PEG



WALL ST

market-value based

*Fig. 5.1* Book-value and market-value based ratios

## 5.2 Book-Value Based Profitability Ratios

The key profitability ratios using book value are presented below:

### ***Operating (EBIT) Margin***

The operating margin measures a company's operating profitability as a percentage of its sales. As a reminder, EBIT stands for Earnings before Interest and Taxes.

$$\text{Operating margin} = \frac{\text{EBIT}}{\text{Sales}}$$

### ***Profit Margin***

The profit margin measures a company's financial profitability as a percentage of its sales.

$$\text{Profit margin} = \frac{\text{Net income}}{\text{Sales}}$$

### ***Return on Capital Employed (ROCE)***

ROCE measures a company's operating profitability (before or after tax) as a percentage of its capital employed or net operating assets .

$$\text{ROCE} = \frac{\text{EBIT or EBIT} \times (1 - \text{tax rate})}{\text{Capital employed}}$$

Capital employed = total assets – current liabilities (simplified)

Capital employed = *net* operating assets = equity + interest – bearing debt – non – core assets

The definition of capital employed changes in the presence of large non-core assets and a company's cash position. See Chap. 1 regarding financial metrics.

Fundamental relation between ROCE and WACC:

The ROCE must be higher than the weighted average cost of capital (WACC) and the net after tax cost of borrowing (if the company is significantly leveraged).

ROCE >> WACC or *net* after tax cost of borrowing

### ***Return on Assets (%) (ROA)***

ROA is similar to ROCE in that it measures asset efficiency in the generation of profit. One huge advantage of ROA is that it can be easily computed. However, this book prefers ROCE to ROA, as the ROCE numerator and denominator are perfectly coherent (i.e., operating income against operating assets). Total assets can include large non-core or value less assets that can bias the ROA ratio.

$$ROA = \frac{\text{Net income}}{\text{Total assets}}$$

### ***Return on Equity (%) (ROE)***

ROE measures the net income generated by a company to its shareholders as a percentage of equity.

$$ROE = \frac{\text{Net income}}{\text{Equity}}$$

### ***Breaking Down ROE***

ROE can be broken down into three metrics:

$$ROE = \frac{\text{Net income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Capital employed}} \times \frac{\text{Capital employed}}{\text{Equity}}$$

$ROE = \text{profit margin} \times \text{asset turnover ratio} \times \text{equity multiplier}$

This equation is similar to the DuPont model but with capital employed replacing total assets. As a reminder, total assets include operating and non-core assets, while capital employed is limited to operating assets.

### ***Price to Book Value or Ratio (P/B or P/BV)***

This mixed ratio (market value versus book value) compares market

capitalization to book value of equity. A ratio of less than one indicates a potential undervaluation, P/B is a fundamental metric used in value investing.

$$P/B = \frac{\text{Capitalization}}{\text{Equity (book value)}} = \frac{\text{Market value per share}}{\text{Book value per share}}$$

Book value per share (BVPS) = shareholders' equity/number of shares outstanding.

## 5.3 Market-Value Based Profitability Ratios

The key profitability ratios using market value are listed below. P/E and EV multiples are presented in greater detail at the end of the section.

### *Dividend Yield (%)*

The dividend yield measures the cash dividend paid out to shareholders as a percentage of the market value per share. Dividends can also be paid in additional shares (cash efficient for a company as no cash outflow is incurred and tax efficient for the shareholders as a dividend paid in shares is usually not treated as a taxable income).

$$\text{Dividend Yield} = \frac{\text{Dividend per share}}{\text{Market value per share}}$$

In a low interest rate environment, a dividend is a formidable competitor against a bond coupon. It provides a safety cushion against a falling share. The dividend yield and payout ratios are therefore important metrics to watch.

### *Earnings Yield (%)*

The earnings yield measures the earnings per share generated by the company as a percentage of the share price.

$$\text{Earnings Yield} = \frac{\text{Earnings per share}}{\text{Market value per share}}$$

*Net income/market cap = EPS/share price = E/P* (the inverse or reciprocal of P/E)

Earnings yield is comparable to ROE, using market value instead of book value of equity.

### ***Dividend Payout Ratio (%)***

The dividend payout ratio measures the cash dividend paid out to shareholders as a percentage of earnings per share (EPS).

$$\text{Dividend payout ratio} = \frac{\text{Dividend per share}}{\text{Earnings per share}}$$

### ***Price-Earnings Ratio (P/E)***

P/E is a popular valuation metric used for investing in the stock market.

$$P/E = \frac{\text{Market value per share}}{\text{Earnings per share}}$$

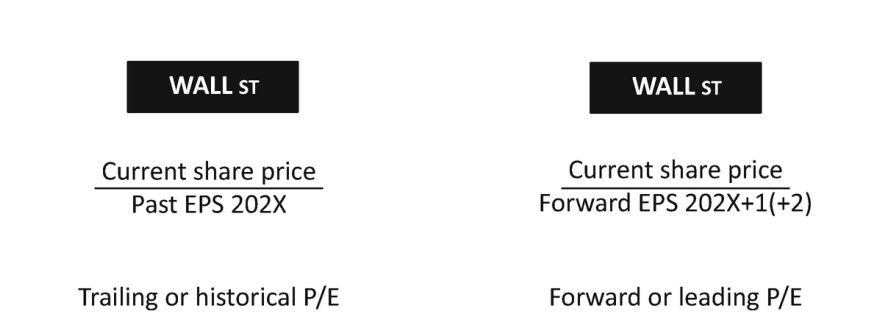
or

$$P/E = \frac{\text{Market capitalization}}{\text{Net Income}}$$

- Market value (price) per share = current share price
- Earnings per share = EPS = net income/number of shares outstanding
- Market capitalization = number of shares outstanding × market value or price per share

If a company's P/E is equal to "x," it means that investors are willing to pay x times earnings for its shares. Simply put, it will take x years to recover the initial investment, should the stock generate the same earnings for the next x years (no growth in earnings and no dividend reinvestment)

considered). The P/E multiple can be trailing or forward.  
 The difference between the two multiples is illustrated in Fig. 5.2.



**Fig. 5.2**Trailing versus forward P/E

Within the same sector, a low trailing company P/E suggests a relatively lower valuation compared to its peers, but it can also indicate lower expected earnings growth. Therefore, a lower valuation may be perfectly rational.

A high trailing P/E suggests a relatively higher valuation for a company when compared to its peers, but it can also indicate higher expected growth in earnings. Therefore, a higher valuation may also be perfectly rational.

See the following example for a specific stock (Table 5.1):

**Table 5.1**Trailing versus forward P/E comparison

P/E Trailing/Forward	Year X past (Trailing)	Year X+1(+2) (Forward)
Current stock price	\$100	\$100
EPS	8	10
P/E	12.5	10
\$25 for P/E		

This stock seems underpriced based on its history (it should trade at around \$125 = sector P/E of 12.5 × current EPS of 10). However, when the focus is placed on forward earnings, we see that it is priced fairly (\$100 = sector P/E of 12.5 × forward EPS of 8). Because the market always anticipates future cash flows (here, a decline in EPS), a stock price of \$100 looks rational.

**Price-Earnings to Growth Ratio (PEG)**

The PEG is the perfect companion to the P/E ratio . It measures the amount of P/E per unit of EPS growth and helps the stock screening process.



$$PEG = \frac{P/E}{\text{Expected } EPS \text{ growth}}$$

Where P/E = trailing or leading P/E

For example, the comparable companies SG and HG are presented below (Table 5.2):

**Table 5.2** P/E and PEG ratios (SG, sector and HG)

Comparison	Company SG	Company HG	Sector
P/E (leading)			
Estimated growth in EPS (%)			
PEG			

Intuitively, relative to the relative P/E and potential EPS growth, company HG seems underpriced, and company SG overpriced. For example, the surplus growth potential of HG (i.e., 13% > 10%) does not seem to be reflected in its current price. The same observation is made for SG: its relative slow growth potential (i.e., 7% < 10%) should negatively impact its price. A lower PEG generally indicates potential undervaluation, and a higher PEG indicates potential overvaluation.

Other potential reasons explaining the deviations:

- If HG is highly leveraged, then its lower valuation may be justified.
- If SG is debt-free, then its higher valuation may be justified.

### ***Enterprise Value to EBITDA Multiple (EV Multiple)***

The EV to EBITDA multiple (i.e., the Enterprise value to Earnings before Interest, Taxes, Depreciation and Amortization multiple) measures the amount of long-term capital (at market value) needed to generate one dollar of EBITDA . In parallel, it measures the total operating assets (at market value) needed to generate one dollar of EBITDA.

As an example, if the EV to EBITDA ratio is equal to ten (or 10/1), ten dollars of equity and debt (or operating assets ) produce one dollar of EBITDA. The lower the ratio, the better the EV productivity and efficiency in generating EBITDA .

The EV multiple can be trailing or forward. Enterprise value is the best alternative to pure market capitalization, as it considers not only the equity side but also the debt and cash side of a balance sheet .

Enterprise value to EBITDA multiple =  $\frac{EV}{EBITDA}$

If the financial market is fully efficient, the price of equity (cost of ownership of the company) should reflect the risk involved by debt. Two companies with the same forward EBITDA but with a different level of debt should not be priced the same. After all, if you own a company, you also own the debt on the balance sheet and carry its default risk.

A low EV multiple indicates that company’s operating efficiency looks satisfactory. A company with a lower EV multiple than its peers is considered undervalued. P/E and EV multiple are highly complementary but remain relative ratios, they should be further analyzed and compared with their sector average and competitors.

A comparison of the two multiples is presented below (Table 5.3):

Table 5.3P/E and EV to EBITDA multiples

EV multiple		
Shareholder (shareholder and debt holder)		
Weighted average cost of capital required		
Management does not have the level of debt of interest		
High volatility		
Multiple is subjective: conflicting interpretations (non-standard metric)		
Market purchase or buyback through debt		
Business decisions (depreciation, amortization, impairment, and financing decisions) have an impact		
EBITDA is a proxy for operating cash revenue		
EBITDA is a rough estimate (capex for investments, working capital)		
Slowly depreciating assets may significantly differ from the real capex needs. For companies with high capex needs, EBITA (i.e., EBITDA without Depreciation), EBIT or (EBITDA – capex) may be preferred.		
EBITDA is a rough proxy for operating cash revenue		
Not suitable for EBITDA		

Enterprise Value to EBIT Multiple

The enterprise value to EBIT multiple measures the amount of long-term capital (at market value) needed to generate one dollar of EBIT. In parallel, it measures the total operating assets (at market value) needed to generate one dollar of EBIT.

As an example, if the EV to EBIT ratio is equal to fifteen (or 15/1), fifteen dollars of equity and debt (or operating assets) produce one dollar of

EBIT. The lower the ratio, the better the EV productivity and efficiency in generating EBIT .

$$\text{Enterprise value to EBIT multiple} = \frac{EV}{EBIT}$$

**Enterprise Value to Sales Multiple**

The enterprise value to sales multiple measures the amount of long-term capital (at market value) needed to generate one dollar of sales. In parallel, it measures the total operating assets (at market value) needed to generate one dollar of sales.

As an example, if the EV to sales ratio is equal to five (or 5/1), five dollars of equity and debt (or operating assets ) produce one dollar of sales. The lower the ratio, the better the EV productivity and efficiency in generating sales .

$$\text{Enterprise value to sales multiple} = \frac{EV}{\text{Sales}}$$

# 5.4 Case Study (Operating, Financial Performance and Leverage)

Please note that th ese three economic and financial dimensions should always be linked. As an illustration, let us consider the following two comparable companies Green and Purple, from the same industry. Their simplified balance sheets are valued at market price (Tables 5.4 and 5.5).

Table 5.4Company Green’s balance sheet

Company Green, \$1000 (market value) Year X			
Enterprise value of operating assets at Fair Market Value or FMV)			
Less cash			

<b>Total assets and liabilities</b>			

Table 5.5Company Purple’s balance sheet

<b>Company Purple, \$1000 (market value) Year X</b>			
<b>Fixed capital value of operating assets at FMV</b>			
<b>Excess cash</b>			
<b>Total assets and liabilities</b>			

Their simplified income statements are as follows (Table 5.6):

Table 5.6 Income statements (Green and Purple)

<b>Company Green and Purple, \$1000</b>	<b>Company Purple</b>	
<b>EBITDA</b>		
<b>Depreciation and amortization</b>		
<b>Operating income (EBIT)</b>		
<b>Interest expense</b>		
<b>Income tax (25%)</b>		
<b>Net income</b>		

*Detailed calculations of the price-to-earnings ratios*

- Earnings yield (Green) = \$105,000/\$840,000 = 12.5%
- P/E (Green) = \$840,000/\$105,000 = 8×
- Earnings yield (Purple) = \$86,250/\$350,000 = 24.6%
- P/E (Purple) = \$350,000/\$86,250 = 4×

Table 5.7 provides an overview of the earnings multiples.

Table 5.7Profitability ratios (Green and Purple)

<b>Profitability Ratios</b>		
<b>Earnings yield</b>		
<b>P/E</b>		

*Reminder:* earnings yield and P/E are inversed ratios.

$1/(8\times) = 12.5\%$  (i.e., inverse of  $P/E = 1/(P/E) = E/P =$  earnings yield)

To conclude that company Purple is the better stock selection (with the highest earnings yield and the lowest P/E) would be biased, as no risk analysis has been undertaken. The relatively low P/E may be perfectly justified by a higher risk factor.

Let us therefore calculate the different financial leverage and debt ratios (Table 5.8).

Table 5.8Debt ratios (Green and Purple)


Financial leverage and debt ratios	Company Green	Company Purple
Net debt, \$1000	160	650
Market value of equity (MVE), \$1000	840	350
Enterprise value (EV), \$1000	1000	1000
Net debt/MVE	19%	186%
Net debt/EV	16%	65%
Multiplier (EV/MVE)	1.0	1.3
Coverage ratio (EBIT/int exp)	1.3	1.3
Coverage ratio (EBITDA/int exp)	1.5	1.5

The debt to equity ratio is calculated as follows:

- Company Green: Net debt (\$160,000) << MVE (\$840,000)
- Company Green: Net debt/MVE = 160/840 = **19%** << 100%
- Company Purple: Net debt (\$650,000) >> MVE (\$350,000)
- Company Purple: Net debt/MVE = 650/350 = **186%** >> 100%

We can now infer from the previous calculations that company Purple is heavily leveraged, and there is no doubt that company Purple’s earnings yield needs to be high in order to compensate for its heavy debt load.

The following ratios confirm that both companies generate the same operating profitability (Table 5.9).

Table 5.9 Profitability ratios (Green and Purple)

Profitability Ratios	Company Green	Company Purple
Earnings yield	16%	16%
P/E	15	15
EBIT/EV yield	16%	16%
EV multiple (EV/EBITDA)	1.5	1.5

Some unanswered questions remain:

- Is company Purple’s yield worth the risk taken?
- Is the risk totally and sufficiently compensated?
- How do Green or Purple compare with the sector and to their peers?

**Conclusion According to the Limited Information Available**

A risk-adverse investor would probably choose to invest in company Green’s equity, as company Green has achieved an adequate financial and operating profitability with virtually no debt.

A growth investor would probably check company Purple’s future earnings estimates and evaluate whether the company is showing superior growth. If the response is positive, buying this security with a trailing P/E

at only 4× is a very attractive option.  
See the following case study using forward earnings multiples.

## 5.5 Case Study (Forward P/E and EV Multiples)

Complimentary P/E and EV multiple approaches are now being applied to comparable companies.

Companies Serenity and Bold are direct competitors.

Which stock should an investor select: Stock Serenity or Bold?

In this case study, we use target prices , so we therefore apply forward-looking multiples .

$$\text{Forward multiple (P/E or EV)} = \text{current market cap or EV} / \text{forward earnings or EBITDA}$$

Here are the accounting and market data concerning the two companies Serenity and Bold (Tables 5.10 and 5.11):

Table 5.10Market valuations (Serenity and Bold)

Share price and market capitalization of Company	Serenity	Bold
Number of shares		
Share price in \$		
Market capitalization, in millions \$		

Table 5.11Expected earnings and dividends (Serenity and Bold)

Projected income statement, \$, in millions	Serenity	Bold
Forward EBITDA		
Estimated Depreciation and Amortization (D&A)		
Estimated interest expense		
Corporate tax (25%)		
Forward net earnings		
Forward net dividends		

Table 5.12 provides an overview of the forward ratios based on forward earnings.

Table 5.12Forward earnings multiples (Serenity and Bold)


P/E analysis	Company	Bold	
Forward P/E			
Forward earnings yield			

### 5.5.1 The Forward P/E Approach

According to a P/E approach, company Serenity appears slightly overpriced, as its forward P/E is larger, and its earnings yield smaller than the sector average. In contrast, company Bold seems fairly priced.

Here, we will use the P/E ratio derived from the sector in order to estimate a target market price.

Assumption taken: The P/E ratio of companies Serenity and Bold converge toward the forward sector average of nine times.

We use the following formula:

$$\text{Target P/E} = \text{target market capitalization} / \text{forward net earnings}$$

*We start with the calculations for company Serenity*

- Target market cap Serenity = forward net earnings Serenity  $\times$  forward sector P/E
- Target market cap Serenity = \$14.625 million  $\times$  9 = \$131.625 million
- Target share price Serenity = \$131.625 million / 1 million shares = **\$132** (rounded)

*We continue with company Bold*

- Target market cap Bold = forward net earnings Bold  $\times$  forward Sector P/E
- Target market cap Bold = \$8.925 million  $\times$  9 = \$80.325 million
- Target share price Bold = \$80.325 million / 1000,000 shares = **\$80** (rounded)

The P/E valuation approach shows the following results (Table 5.13):

Table 5.13Target share prices (Serenity and Bold)

Target share price, \$	Company	Bold
Current price		
Target price (P/E ratio)		

### 5.5.2 The Forward EV Multiple Approach

The EV multiple approach provides a different perspective .

$$EV = \text{market capitalization} + \text{debt} - \text{excess cash}$$

Table 5.14 shows the EV calculation for both companies:

Table 5.14EV calculations (Serenity and Bold)

EV calculation, \$, in millions	Company Serenity	Company Bold
Market capitalization		
Debt		
Excess cash		
EV		

Table 5.15 provides an overview of the forward EV multiples based on forward EBITDA .

Table 5.15 Forward EV multiples (Serenity and Bold)

Company/EBITDA multiple			
Current EV/forward EBITDA			

*The calculations for the forward EV multiples are outlined below:*

- Forward EV to EBITDA multiple Serenity = 160/30 = 5.3
- Forward EV to EBITDA multiple Bold = 220/30 = 7.3

As we can see above, company Serenity has a much lower EV to EBITDA multiple and therefore looks more efficient in the management of its operating assets .

Next, we will use the EV to EBITDA multiple derived from the sector in order to estimate a target market price for each stock.

### 5.5.3 Target Market Capitalizations

#### Using the Forward Sector EV Multiple

We are now calculating the target market capitalizations for companies Serenity and Bold by using the forward sector EV to EBITDA multiple.

#### Target Market Capitalization of Company



## *Serenity*

Assumption taken: the forward EV multiple of company Serenity converges toward the forward sector average of 6.5 times .

We use the following formula:

$$\text{Target EV multiple} = \text{Target EV} / \text{forward EBITDA}$$

*The calculations are outlined below:*

- Target EV multiple (Serenity) = forward EV multiple (sector) = 6.5 times
- Target EV (Serenity)/forward EBITDA (Serenity) = 6.5 times
- Therefore, target EV (Serenity) =  $6.5 \times \$30 \text{ million} = \$195 \text{ million}$
- EV = market cap + debt – cash
- Target EV (Serenity) = 195 = target market capitalization (Serenity) + 50–40

Therefore, the target market capitalization (Serenity) =  $195 + 40 - 50 = \$185 \text{ million}$

This shows that company Serenity seems to be undervalued by \$35,000,000 (i.e.,  $\$185,000,000 - \$150,000,000 = \$35,000,000$ )

The “fair value” of stock Serenity is calculated as:

$\$185,000,000 / 1,000,000 \text{ shares} = \mathbf{\$185}$

Thus, the market seems to price stock Serenity well below its fair value, ignoring the large cash position and its low level of debt when compared to stock Bold.

## *Target Market Capitalization of Company Bold*

Assumption taken: the forward EV multiple of company Bold converges toward the forward sector average of 6.5 times.

We use the following formula:

$$\text{Target EV multiple} = \text{Target EV} / \text{forward EBITDA}$$

*The calculations are outlined below:*

- Target EV multiple (Bold) = forward EV multiple

(sector) = 6.5 times

- Target EV (Bold)/forward EBITDA (Bold) = 6.5 times
- Therefore, target EV (Bold) = 6.5 × \$30 million = \$195 million
- EV = market cap + debt – cash
- Target EV (Bold) = 195 = target market capitalization (Bold) + 150 – 10

Therefore, target market capitalization (Bold) = 195 + 10 – 150 = \$55 million

Here, company Bold seems to be overpriced by \$25,000,000 (i.e., \$80,000,000 – \$55,000,000 = \$25,000,000)

The “fair value” of stock Bold is calculated as:

$$\text{\$55,000,000} / 1,000,000 \text{ shares} = \text{\$55}$$

Thus, the market seems to price stock Bold well over its fair value, ignoring the larger amount of debt compared to stock Serenity and its associated risk.

The two valuation approaches show the following results (Table 5.16).

Table 5.16 Target share prices (Serenity and Bold)

Target share prices	Company Serenity	Company Bold
Current price in \$	150	80
Target price (P/E ratio)	132	80
Target price (EV multiple)	155	80
Dividend yield	1.7%	1.7%

### 5.5.4 Conclusion Incorporating the Debt Situation

Both multiples establish a price range for the two stocks:

- Stock Serenity [132; **150**; 185]
- Stock Bold [55; **80**; 80]

Stock Bold is at the top of its range, stock Serenity is positioned at the middle.

Let us now look at different debt ratios as financial leverage cannot be ignored as shown below (Table 5.17):

Table 5.17 Financial leverage and debt ratios (Serenity and Bold)

Financial leverage and debt ratios	Company Serenity	Company Bold
Debt (debt - excess cash)	100	100
Market capitalization	150	80

Enterprise value			
1250%OK			
1250%OK			
6450%OK			
3000%OK			
1250%OK			
1250%OK			
1250%OK			

Company Bold is heavily leveraged. In this case, company Serenity is a low risk bet as far as credit risk is concerned.

## Conclusion, According to the Limited Information Available

In this example, we clearly see that the EV multiple adds value by putting debt and cash at the core of the analysis when the P/E multiple ignores them.

Stock Serenity seems to offer an upside potential (according to the EV multiple), and stock Bold may be overpriced.

As the above calculations show us, ratios do help in screening stocks, but a qualitative analysis is always necessary prior to investment (product positioning and pipeline, management team, corporate sustainability, etc.).

One possible explanation for Bold’s overpricing may be that this company is viewed as a high dividend yielding stock and therefore is a more sought-after investment. There is usually a high demand for “value” stocks, especially during times of low interest rates!

## 5.6 Value and Growth Investing

Each investor determines his or her own definition of value versus growth. The limits below are general rules of thumb and useful guidelines. They will however differ by industry.

Some potential differentiators are listed below (Table 5.18):

Table 5.18Value versus growth comparison

Value and growth		
P/E		
P/B		
High growth		
EV to EBITDA multiple		

High dividend		
Beta		
Price to book value		
Moat		
Fundamental value		
Highly liquid		
Highly liquid		

## 5.7 Key Takeaways on Profitability Ratios and Their Limitations

Here are the key ratios used to measure a company’s profitability (Table 5.19):

**Table 5.19**Profitability ratios

ROE	Capital employed and net income/equity	
P/E	Price/earnings	
EV/EBITDA	EV/EBITDA or EBIT	

### Limitations

- It is optimal to measure both the book- and market-value based profitability (when available).
- For consolidated financial statements, if the net income attributable to (or available for) common shareholders is used as the numerator, then the non-controlling interest must be deducted from total equity in the ROE calculation.
- Always associate net income profitability with operating profitability, as a company needs happy stakeholders (debt holders included). P/E and EV multiples are complementary.
- Current net income can be distorted by non-recurring/non-operating/non-cash expenses or revenues. Normalizing adjustments may be required.
- Forward (P/E or EV ) multiples are preferable but are dependent on the quality of forward earnings or EBITDA (optimistic or conservative estimates?).
- Real capital expenditure (capex ) needs are to be considered when

using EBITDA or EBIT -only ratios (i.e., real capex may differ significantly from depreciation and amortization charges).

- Always associate profitability with risk (including intrinsic risks such as debt), as a return analysis without measuring the risk taken is meaningless. A P/E ratio cannot be analyzed without looking at financial leverage.

Remember, ratios are sector-related, so be sure to check trends and competitors.

## References and Further Reading

- Anthony, Robert N., and James S. Reece. 1989. *Accounting: Text and Cases*. Irwin.
- Coulon, Yannick. January 2017. *Guide pratique de la finance d'entreprise*. Gualino.
- . 2018. *L'essentiel des ratios financiers*. Maxima Laurent du Mesnil.
- Jones, Bill, Terry Jones, Theo Kocken, and Ben Timlett. March 2016. *Boom Bust Boom*. TV Documentary (USA).
- Minsky, Hyman P. 2008. *Stabilizing an Unstable Economy*. McGraw-Hill.
- Quiry, Pascal, and Yann Le Fur. 2019. *Finance d'entreprise 2020 de Pierre Vernimmen*. Dalloz.
- Stowe, John D., Thomas R. Robinson, Jerald E. Pinto, and Dennis W. McLeavey. August 2002. *Analysis of Equity Investments: Valuation*. AIMR and CFA Institute.
- Thibierge, Christophe. November 2013. *Comprendre toute la finance*, 2ème édition. Vuibert.
- Walsh, Ciaran. 2008. *Key Management Ratios*, 4th ed. Financial Times Series. FT Prentice Hall. Pearson Education Limited.

## 6. Case Studies

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### Abstract

Two large case studies allow the implementation of the full set of ratios:

- A small family business is fully analyzed
- Three giant retail companies, namely Amazon, Walmart and Alibaba, are also scrutinized.

Concise fundamental analyses, incorporating both qualitative and quantitative data, are performed.

**Keywords** Enterprise value Ratio analysis of a non-listed family business Alibaba Amazon Walmart

## 6.1 Brief Introduction to the Case Studies

In the following case studies, the full set of ratios will be implemented in two different company environments.

- A small unlisted company, PAB
- Three large corporations, namely Alibaba group, Amazon and Walmart

A simplified quantitative and qualitative analysis of the companies is

performed.

# 6.2 A Private Company in Trouble: PAB Limited

PAB is a small, unlisted retailer. The manager is a young and energetic woman with true selling expertise. She bought the company in year X – 2.

The simplified financial statements for the year X and X – 1 are as follows (Tables 6.1 and 6.2):

Table 6.1Company PAB’s balance sheet

Balance sheet	PAB (in \$)	Year X	Year X – 1		
Property, Plant and Equipment (PP&E) net	100,000	100,000	100,000		
Short-term bank loans	20,000	20,000	20,000		
Accounts receivable	30,000	30,000	30,000		
Prepaid expenses	10,000	10,000	10,000		
Accounts payable	50,000	50,000	50,000		
Long-term bank loans	50,000	50,000	50,000		
Shareholders' equity	100,000	100,000	100,000		

Table 6.2Company PAB’s income statement

Income statement	PAB (in \$)	Year X	Year X – 1		
Net sales	100,000	100,000	100,000		
Cost of goods sold	60,000	60,000	60,000		
Inventory change (beg–end)	15,000	15,000	15,000		
Operating expenses	30,000	30,000	30,000		
Depreciation and amortization	10,000	10,000	10,000		
Interest charges	2,000	2,000	2,000		
Other income	2,000	2,000	2,000		
Net income	10,000	10,000	10,000		
Extraordinary items	1,000	1,000	1,000		
Tax	0	0	0		
Net income	11,000	11,000	11,000		

Repayment of principal = \$10,000/year ×

A negative inventory change, which is equivalent to an increase in inventory, should be deducted from the “purchases of goods” line. These purchased goods were not consumed or sold by the company during the

current year and were added as an entry to ending inventory.

Here is EBITDA with COGS as an expense (Table 6.3):

Table 6.3EBITDA with COGS

EBITDA with COGS (in \$)	Year 1	Year 2
\$435,000		
725,000 goods sold or COGS (goods consumed)		
390,000 expenses		
1,000 before Interest, Taxes, Depreciation and Amortization (EBITDA)		

We will now analyze company PAB according to the different ratio families: namely efficiency, liquidity , solvency , debt and finally profitability ratios.

### 6.2.1 PAB’s Efficiency Ratios

We start with the working capital analysis.

Table 6.4 gives an overview of the working capital metrics.

Table 6.4Company PAB’s working capital analysis

Working capital analysis (in \$)	Year 1	Year 2
725,000 long-term capital (long-term capital – Fixed assets)		
350,000 short working capital needs from operations		
250,000		

#### Working capital calculation

Working capital = long-term capital – fixed assets (equivalent to current assets – current liabilities)

$$=250,000 + 215,000 + 15,000 – 105,000 = \$375,000$$

$$=715,000 + 120,000 + 10,000 + 5000 + 35,000 – 320,000 – 145,000 – 45,000 = \$375,000$$

#### Non-Cash Working Capital (NCWC) from operations calculation

Non-cash working capital needs from operations = current assets excluding cash – current liabilities excluding short – term financing

$$= 715,000 + 120,000 + 10,000 – 320,000 – 145,000 = \$380,000$$

$$\text{Cash} = 5000 + 35,000 = \$40,000$$

#### Net cash calculation

$$\text{Net cash} = 375,000 – 380,000 = 5000 + 35,000 – 45,000 = – \$5000$$

### Findings



The non-cash working capital needs from operations are financed by the excess of long-term capital over fixed assets (i.e., \$375,000). Non-cash working capital needs are artificially low due to oversized accounts payable (i.e., \$320,000). At a reasonable level, the accounts payable would be equivalent to approximately two months of annual consumption of traded goods (or cost of goods sold , for a retailer).

Two months of annual consumption (COGS ):

$$\begin{aligned} &= 2/12 \times (\text{Annual purchases} + \text{beginning stock} - \text{ending stock}) \\ &= 2/12 \times (860,000 + 580,000 - 715,000) = 1/6 \times 725,000 \\ &= \text{approximately } \$120,000 \end{aligned}$$

Normalized accounts payable = **\$120,000**

If we replace \$320,000 with \$120,000 in the formula, the normalized non-cash working capital needs look much larger than the present figure: \$580,000 versus \$380,000.

Normalized non-cash working capital needs:

$$= 715,000 + 120,000 + 10,000 - 120,000 - 145,000 = \mathbf{\$580,000}$$

## Conclusion on Working Capital

PAB would need to find an additional \$200,000 to finance its operations. This is a considerable amount. It looks like the suppliers are either willingly or unwillingly subsidizing this business by granting exceptional (i.e., abnormal) payment terms.

We continue with the calculation of the working capital days, namely the inventory, accounts receivable and accounts payable days.

## Inventory Days

Here is a list of possible inventory ratios employing different numerators (average or ending inventory) and denominators (i.e., purchases, sales or COGS ) (Tables 6.5 and 6.6):

Table 6.5Company PAB’s inventory data

Inventory data (in \$)	Year 2011	
Beginning inventory, beginning		
Ending inventory, ending		
Average inventory, average		
Sales		
Purchases		

<del>715,000</del>	consumption (COGS)	
<del>1985</del>	consumption (daily COGS)	

**Table 6.6**Company PAB’s inventory days

Inventory days	Year X 1	
<del>205</del>	Inventory days = average Inv/daily purchases	
<del>206</del>	Inventory days = ending Inv/daily purchases	
<del>196</del>	Inventory days = average Inv/daily sales	
<del>206</del>	Inventory days = ending Inv/daily sales	
<del>326</del>	Inventory days = average Inv/daily COGS	
<del>360</del>	Inventory days = ending Inv/daily COGS	

*The detailed calculation for inventory days (year X) using ending inventory and COGS is outlined below:*

- Inventory days = ending inventory/daily COGS
- COGS = 580,000 – 715,000 + 860,000 = \$725,000
- Inventory days = 715, 000/[725, 000/365] = **360 days**

Not only do inventories appear excessive in relation to the goods sold, which are equivalent to one selling year, but the trend is also negative here. Why were the purchases so important (at \$860,000) with such a high inventory (at \$580,000) at the beginning of the year? Was the existing stock saleable? This could mean that there is a massive depreciation risk (inventory write-off)!

## Accounts Receivable Days

Table 6.7 provides an overview of the calculated accounts receivable days.

**Table 6.7**Company PAB’s accounts receivable days

Accounts receivable	Year X 1	
<del>120,000</del>	accounts receivable (in \$)	
<del>34</del>	accounts receivable days	

*Detailed calculation for accounts receivable days (year X)*

- Accounts receivable days = Accounts receivable/daily sales
- Accounts receivable days = 120,000/(1, 275,000/365 days)
- Accounts receivable days = 120,000/3493 = **34 days**

## Accounts Payable Days

Table 6.8 provides an overview of the calculated accounts payable days.

**Table 6.8**Company PAB’s accounts payable days

Accounts payable	Year X 1	
£20,000		
Accounts payable (in \$)		
Accounts payable days		

*The detailed calculations for accounts payable days (year X) are outlined below:*

- Accounts payable days = Accounts payable/daily purchases
- Accounts payable days = 320,000/(860,000/365 days)
- Accounts payable days (purchases) = 320,000/2356 = **136 days**
- Accounts payable days = Accounts payable/daily COGS
- Accounts payable days = 320,000/(725,000/365 days)
- Accounts payable days (COGS ) = 320,000/1986 = **161 days**

## Conclusion on Working Capital Days

On the positive side, customers have paid their bills more promptly, and this brings the accounts receivable ratio down from 46 to 34 days. On the negative side, the accounts payable ratio has deteriorated sharply, with the company paying its suppliers with an average delay of roughly four to five months. Thus, there is a significant risk that suppliers will stop their deliveries and start legal proceedings! Remember, they are suppliers, not bankers.

### 6.2.2 PAB’s Liquidity Ratios

We now undertake a liquidity analysis.

Table 6.9 provides an overview of the adjusted liquidity ratios excluding prepaid expenses.

**Table 6.9**Company PAB’s liquidity ratios

Liquidity ratios	Year X 1	
Current ratio		
Quick ratio		
Cash ratio		

*The detailed calculations for the adjusted liquidity ratios (year X) are outlined below :*

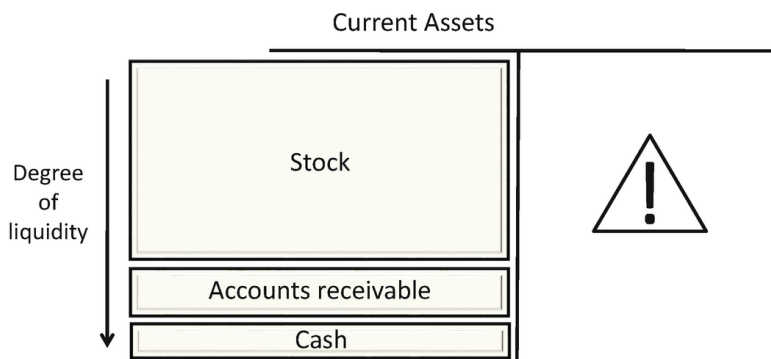
- Current ratio =  $(715,000 + 120,000 + 5000 + 35,000) / (320,000 + 145,000 + 45,000) = 875,000 / 510,000 = \mathbf{171.6\%} >> 100\%$  (good)
- Quick ratio =  $(120,000 + 5000 + 35,000) / (510,000) = 160,000 / 510,000 = \mathbf{31.4\%} << 100\%$  (too low)
- Cash ratio =  $(5000 + 35,000) / (510,000) = 40,000 / 510,000 = \mathbf{7.8\%} << 50\%$  (too low)

Prepaid expenses can be excluded from liquidity ratios. They do not represent future cash inflows, and they cannot be converted into cash to face short-term liabilities (e.g., a prepaid insurance policy or rent).

## *Conclusion on Liquidity*

There is a huge imbalance between excessive stock and low cash on hand. Even if the cash ratio does slightly improve, the situation is still alarming with inventories reaching an astronomical level. They represent 80% of the current assets.

Figure 6.1 illustrates the unfavorable asset mix hurting PAB's liquidity



*Fig. 6.1* Company PAB's current assets

## *6.2.3 PAB's Debt and Solvency Ratios*

The ratios used for the debt analysis are presented below, namely the debt to equity and debt coverage ratios.

### *Debt to Equity Ratios (Static Approach)*

Table 6.10 provides an overview of PAB's financial leverage for the last two years.

Table 6.10 Company PAB’s debt ratios

Financial leverage	Year X	Year X - 1
Net financial debt to equity ratio		
Net banking debt to quasi equity ratio		

The calculations for the debt to equity ratios (year X) are outlined below :

- Net financial debt = 215,000 + 15,000 + 45,000 – 5000 – 35,000 = \$235,000
- Net banking debt = 215,000 + 45,000 – 5000 – 35,000 = \$220,000
- “Quasi” equity = capital + loans from shareholders = 250,000 + 15,000 = \$265,000
- Net banking debt to quasi equity ratio (year X) = 220,000/265,000 = **83 %** (104 % in year X – 1)

## Debt Coverage Ratios (Dynamic Approach)

Table 6.11 provides an overview of PAB’s coverage ratios.

Table 6.11 Company PAB’s debt coverage ratios

Debt coverage ratios	Year X	Year X - 1
Debt servicing coverage ratio (EBITDA/debt service)		
EBITDA/Int exp coverage ratio (EBITDA/int exp)		
EBIT/Int exp coverage ratio (EBIT/int exp)		
EBITDA to EBITDA ratio		

Detailed calculations for the Debt Service Coverage Ratio (DSCR) (year X)

- Debt service = 10,000 (principal) + 9000 (interest) = \$19,000
- DSCR = EBITDA/debt service = 51,000/19,000 = **2.7** > 2

There is enough operating cash for debt servicing and possibly capital expenditure (capex ) but not enough cash for a negative extraordinary item (bad surprise).

Detailed calculations for the Interest Coverage Ratio (ICR) (year X)

- Interest expense = 9000
- ICR = EBIT/interest expense = 19,000/9000 = 2.1 << 3

The interest coverage ratio is too low.

Detailed calculations for the debt to EBITDA ratio (year X)

- Net financial debt/EBITDA =  $235,000/51,000 = 4.6 < 5$
- Net banking debt/EBITDA =  $220,000/51,000 = 4.3 < 5$

The amount of debt seems slightly out of proportion.

## ***Cost of PAB's Debt***

The formula used for calculating PAB's cost of debt is the following:

$$\text{Apparent interest rate on debt} = \text{interest exp.} / \text{average financial debt}$$

*Detailed calculations for the cost of debt (year X)*

- Financial debt = long + short-term loans + loans from shareholders
- Financial debt Year X - 1 =  $235,000 + 30,000 + 0 = \$265,000$
- Financial debt Year X =  $215,000 + 45,000 + 15,000 = \$275,000$
- Average financial debt =  $\$270,000$
- Apparent interest rate on debt =  $9000/270,000 = 3.3\%$

## ***Solvency Metrics***

The formula used for calculating PAB's solvency ratio is the following:

$$\text{Solvency ratio} = \text{equity} / \text{total assets}$$

*Detailed calculations*

- Solvency ratio = equity/total assets
- Solvency ratio (year X) =  $250,000/990,000 = 25.25\% > 20\%$
- Solvency ratio (year X - 1) =  $250,000/780,000 = 32\%$
- Net tangible worth (book value) =  $\$250,000 >> 0$

Equity finances 25% of the assets of the company, a satisfactory level.

The trend is negative.

## ***Conclusion on Debt and Solvency***

PAB's debt remains important even if the overall debt ratios have slightly improved.

The company is not in a position to raise additional funds or borrow from a bank, this is a serious concern.

It is worth mentioning that the apparent cost of debt is greater than either net return on capital employed (ROCE) or normalized Return on Equity (ROE). This is a very negative sign for a company!

## ***6.2.4 PAB's Profitability Ratios***

The ratios used for the profitability analysis are listed and presented below, namely performance margins, ROCE and ROE .

### ***EBITDA Margin***

The formula used for calculating PAB's EBITDA margin is the following:

$$\text{EBITDA margin} = \text{EBITDA} / \text{Sales}$$

#### ***Detailed calculations***

$$\text{EBITDA margin} = 51,000 / 1,275,000 = \mathbf{4\%}$$

The EBITDA margin stands at 4%.

### ***Operating Margin***

The formula used for calculating PAB's operating margin is the following :

$$\text{EBIT margin} = \text{EBIT} / \text{Sales}$$

#### ***Detailed calculations***

$$\text{EBIT margin} = 19,000 / 1,275,000 = \mathbf{1.5\%}$$

The Earnings before Interest and Taxes (EBIT ) margin stands at 1.5%.

### ***Profit Margin***

The formula used for calculating PAB's profit margin is the following:

$$\text{Profit margin} = \text{normalized (recurring) net income} / \text{sales}$$

### *Detailed calculations*

- Normalized net income = adjusted net income before tax  $\times$  (1 – tax rate)
- Normalized net income =  $(0 + 10,000) \times (1 - 0.25) = \$7500$
- Profit margin =  $7500/1,275,000 = \mathbf{0.6\%}$

The extraordinary item, by definition non-recurring, of  $-\$10,000$  is eliminated, and a tax rate of 25% is then applied.

The profit margin stands at 0.6%.

## ***Return on Capital Employed (ROCE, Net After Tax)***

The formula used for calculating PAB's ROCE after tax is the following :

$$\text{Net ROCE (after tax)} = (\text{EBIT} - \text{tax}) / (\text{capital employed} = \text{net operating assets})$$

### *Detailed calculations*

- $\text{EBIT} - \text{tax} = \text{EBIT} \times (1 - \text{tax rate}) = 19,000 \times 0.75 = \$14,250$
- Net operating assets = fixed assets + operating non-cash working capital
- Net operating assets =  $105,000 + 380,000 = \$485,000$
- Capital employed = long-term capital – cash
- Capital employed = equity + interest-bearing debt – cash
- Capital employed  
 $= 250,000 + 215,000 + 15,000 + 45,000 - 5000 - 35,000 = \$485,000$
- Net ROCE =  $14,250/485,000 = \mathbf{2.94\%}$

The net ROCE stands at 2.94%.

## ***EV Multiple***

A standard enterprise value (EV) multiple for a retail company is around eight times.

If we take the assumption that the book value of capital employed (or net operating assets) is close to market value, that is to say \$485,000, the EV to EBITDA multiple would be as follows:

### *Detailed calculations*



$EV/EBITDA = \$485,000/51,000 = 9.5 > 8$

The ratio is above the industry specific ratio, which indicates a lower operating efficiency than an average firm in the sector.

Return on Equity

The formula used for calculating PAB’s ROE is the following:

Financial profitability = ROE = *net* income/equity

Detailed calculations

- Normalized net income = (0 + 10,000) × (1 – 0.75) = \$7500
- The extraordinary item, by definition non-recurring, of –\$10,000 is eliminated, and a tax rate of 25% is then applied.
- Normalized ROE = 7500/250,000 = 3%

The normalized ROE stands at 3%.

Conclusion on PAB’s Profitability

These returns are considered too weak for a retail company. A normalized ROE for a leveraged company such as PAB should be 10% at a minimum.

6.2.5 Summary and Final Thoughts on Company PAB

Here is a summary of meaningful PAB’s ratios (Table 6.12):

Table 6.12Company PAB’s key ratios

Key ratios	Year X 1	Year X 2	Year X 3
Working capital days			
4460 days			
1460 days			
1460 days receivable days			
9060 days payable days			
Liquidity ratios			
0.32 ratio			
0.12 ratio			
0.20 ratio			

<i>Debt and solvency ratios</i>			
<del>94.0%</del> Debt to equity			
<del>8.0%</del> Equity/assets			
<i>Debt coverage ratios</i>			
<del>1.5</del> DSCR (EBITDA/debt service)			
<del>1.1</del> ICR (EBIT/interest)			
<i>Profitability ratio</i>			
<del>0.5%</del> Operating margin			
<del>15.1%</del> ROCE (after tax)			
<del>8.0%</del>			

The PAB business model does not seem sustainable over the long run. Its financial profitability is not satisfactory for a leveraged company, and it urgently needs both an infusion of cash and massive destocking. With a trade debt of \$320,000, the suppliers hold the fate of the company in their hands.

*Note: A real-life company with the same metrics as the fictitious company PAB went bust one year after its balance sheet was initially published, due to its lack of cash and to the delivery limitations imposed by its suppliers!*

## 6.3 Comparison Between Alibaba, Amazon and Walmart

Alibaba group, Amazon and Walmart are three giant retail companies with distinct core business models that fiercely compete against each other on the world stage. They have expanded their historic business models to become more diversified players on world markets. True omni-channel retailing may be the holy grail they are pursuing. Even the word “retail” may no longer suffice since Amazon Prime Video and the video streaming platform Youku are more services than “pure” retail units.

This comparison cannot however be oversimplified and limited to an “old versus new” economic paradigm. As we know, reality proves to be more complex than a simplistic vision.

Just a word of warning: The comparison between these three prestigious

companies is for educational purposes only. It does not constitute a recommendation to buy or sell stock in these corporations, nor should it be considered investment advice. Moreover, it does not constitute in any way a value judgment on the businesses presented in this section.

Furthermore, readers should not place undue reliance on the calculated projections. They were made as of the date of publication and are not guaranteed to be error or bias free. Any investment remains risky and should respect the investor's risk profile and objectives. Remember, past performance is no guarantee of future performance !

### 6.3.1 Alibaba Group

Alibaba has created one of the most profitable internet business models in the world. Its Business-to-Business (B2B) marketplace connects over two million merchants online. It is also present in the Business-to-Consumer (B2C) arena with Taobao and AliExpress. Most of its activity takes place in China but the situation is constantly evolving.

The following data were extracted from the Alibaba Group Holding Limited's press releases, non-audited, errors and omissions excepted. The information is dated May 15, 2019 (Tables 6.13, 6.14, and 6.15).

**Table 6.13** Alibaba Group's balance sheet, RMB (Yuan), in millions, year ended March 31, 2019

Alibaba Group (RMB, in millions)	March 2019	
49,974	cash, cash equivalents and other liabilities	
33,469	term investments and investment securities	
58,490	prepayments, liabilities and other assets	
107,669	current liabilities	
15,834	deferred cash and escrow receivables	
11,672	intangible assets	
2,654	liabilities change	
72,900	liabilities	
54,936	the equity	
11,366	long-term interest	
33,257	holders' equity	
70,483	current assets	
76,076	liabilities and equity	

**Table 6.14** Alibaba Group's adjusted balance sheet, \$, in millions, year ended

March 31, 2019

<b>A Balance Sheet</b>	<b>(in millions)</b>	<b>March 2019</b>	
<b>\$2,672</b>	Assets		
<b>\$852</b>	Current assets		
<b>\$1,820</b>	Long-term assets		
<b>\$970</b>	Liabilities		
<b>\$380</b>	Current liabilities		
<b>\$590</b>	Long-term liabilities		
<b>\$1,402</b>	Equity		
<b>\$1,402</b>	Total		

**Table 6.15** Alibaba Group's original income statement , RMB, \$ US, in millions, year ended March 31, 2019

<b>2019</b>	<b>2018</b>	<b>2017</b>	<b>2016</b>	<b>2015</b>	<b>2014</b>	<b>2013</b>	<b>2012</b>	<b>2011</b>	<b>2010</b>	<b>2009</b>	<b>2008</b>	<b>2007</b>	<b>2006</b>	<b>2005</b>	<b>2004</b>	<b>2003</b>	<b>2002</b>	<b>2001</b>	<b>2000</b>	<b>1999</b>	<b>1998</b>	<b>1997</b>	<b>1996</b>	<b>1995</b>	<b>1994</b>	<b>1993</b>	<b>1992</b>	<b>1991</b>	<b>1990</b>	<b>1989</b>	<b>1988</b>	<b>1987</b>	<b>1986</b>	<b>1985</b>	<b>1984</b>	<b>1983</b>	<b>1982</b>	<b>1981</b>	<b>1980</b>	<b>1979</b>	<b>1978</b>	<b>1977</b>	<b>1976</b>	<b>1975</b>	<b>1974</b>	<b>1973</b>	<b>1972</b>	<b>1971</b>	<b>1970</b>	<b>1969</b>	<b>1968</b>	<b>1967</b>	<b>1966</b>	<b>1965</b>	<b>1964</b>	<b>1963</b>	<b>1962</b>	<b>1961</b>	<b>1960</b>	<b>1959</b>	<b>1958</b>	<b>1957</b>	<b>1956</b>	<b>1955</b>	<b>1954</b>	<b>1953</b>	<b>1952</b>	<b>1951</b>	<b>1950</b>	<b>1949</b>	<b>1948</b>	<b>1947</b>	<b>1946</b>	<b>1945</b>	<b>1944</b>	<b>1943</b>	<b>1942</b>	<b>1941</b>	<b>1940</b>	<b>1939</b>	<b>1938</b>	<b>1937</b>	<b>1936</b>	<b>1935</b>	<b>1934</b>	<b>1933</b>	<b>1932</b>	<b>1931</b>	<b>1930</b>	<b>1929</b>	<b>1928</b>	<b>1927</b>	<b>1926</b>	<b>1925</b>	<b>1924</b>	<b>1923</b>	<b>1922</b>	<b>1921</b>	<b>1920</b>	<b>1919</b>	<b>1918</b>	<b>1917</b>	<b>1916</b>	<b>1915</b>	<b>1914</b>	<b>1913</b>	<b>1912</b>	<b>1911</b>	<b>1910</b>	<b>1909</b>	<b>1908</b>	<b>1907</b>	<b>1906</b>	<b>1905</b>	<b>1904</b>	<b>1903</b>	<b>1902</b>	<b>1901</b>	<b>1900</b>	<b>1899</b>	<b>1898</b>	<b>1897</b>	<b>1896</b>	<b>1895</b>	<b>1894</b>	<b>1893</b>	<b>1892</b>	<b>1891</b>	<b>1890</b>	<b>1889</b>	<b>1888</b>	<b>1887</b>	<b>1886</b>	<b>1885</b>	<b>1884</b>	<b>1883</b>	<b>1882</b>	<b>1881</b>	<b>1880</b>	<b>1879</b>	<b>1878</b>	<b>1877</b>	<b>1876</b>	<b>1875</b>	<b>1874</b>	<b>1873</b>	<b>1872</b>	<b>1871</b>	<b>1870</b>	<b>1869</b>	<b>1868</b>	<b>1867</b>	<b>1866</b>	<b>1865</b>	<b>1864</b>	<b>1863</b>	<b>1862</b>	<b>1861</b>	<b>1860</b>	<b>1859</b>	<b>1858</b>	<b>1857</b>	<b>1856</b>	<b>1855</b>	<b>1854</b>	<b>1853</b>	<b>1852</b>	<b>1851</b>	<b>1850</b>	<b>1849</b>	<b>1848</b>	<b>1847</b>	<b>1846</b>	<b>1845</b>	<b>1844</b>	<b>1843</b>	<b>1842</b>	<b>1841</b>	<b>1840</b>	<b>1839</b>	<b>1838</b>	<b>1837</b>	<b>1836</b>	<b>1835</b>	<b>1834</b>	<b>1833</b>	<b>1832</b>	<b>1831</b>	<b>1830</b>	<b>1829</b>	<b>1828</b>	<b>1827</b>	<b>1826</b>	<b>1825</b>	<b>1824</b>	<b>1823</b>	<b>1822</b>	<b>1821</b>	<b>1820</b>	<b>1819</b>	<b>1818</b>	<b>1817</b>	<b>1816</b>	<b>1815</b>	<b>1814</b>	<b>1813</b>	<b>1812</b>	<b>1811</b>	<b>1810</b>	<b>1809</b>	<b>1808</b>	<b>1807</b>	<b>1806</b>	<b>1805</b>	<b>1804</b>	<b>1803</b>	<b>1802</b>	<b>1801</b>	<b>1800</b>	<b>1799</b>	<b>1798</b>	<b>1797</b>	<b>1796</b>	<b>1795</b>	<b>1794</b>	<b>1793</b>	<b>1792</b>	<b>1791</b>	<b>1790</b>	<b>1789</b>	<b>1788</b>	<b>1787</b>	<b>1786</b>	<b>1785</b>	<b>1784</b>	<b>1783</b>	<b>1782</b>	<b>1781</b>	<b>1780</b>	<b>1779</b>	<b>1778</b>	<b>1777</b>	<b>1776</b>	<b>1775</b>	<b>1774</b>	<b>1773</b>	<b>1772</b>	<b>1771</b>	<b>1770</b>	<b>1769</b>	<b>1768</b>	<b>1767</b>	<b>1766</b>	<b>1765</b>	<b>1764</b>	<b>1763</b>	<b>1762</b>	<b>1761</b>	<b>1760</b>	<b>1759</b>	<b>1758</b>	<b>1757</b>	<b>1756</b>	<b>1755</b>	<b>1754</b>	<b>1753</b>	<b>1752</b>	<b>1751</b>	<b>1750</b>	<b>1749</b>	<b>1748</b>	<b>1747</b>	<b>1746</b>	<b>1745</b>	<b>1744</b>	<b>1743</b>	<b>1742</b>	<b>1741</b>	<b>1740</b>	<b>1739</b>	<b>1738</b>	<b>1737</b>	<b>1736</b>	<b>1735</b>	<b>1734</b>	<b>1733</b>	<b>1732</b>	<b>1731</b>	<b>1730</b>	<b>1729</b>	<b>1728</b>
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Original RMB figures were converted into USD at an exchange rate of 1 RMB(CNY) = \$ US 0.15

The income statement data was regrouped in the following order (Table 6.16):

**Table 6.16** Alibaba's adjusted income statement, \$, in millions, year ended March 31, 2019

Alibaba Group (\$, in millions)	March 2019
56,527	
6,139	
2,488	
1,156	
9,700	
1,600	
6,666	
EBITDA	
1,770	
6,110	
1,476	
2,483	
1,148	
1,340	

Adjusted EBITDA = *RMB* 121,943 million or **\$18,291** million

The Alibaba's minority interest is a net loss . This interest is therefore added to and not deducted from the net income, as the majority shareholders of Alibaba should not carry the loss of the minority shareholders. It is important to remember that in consolidated statements, all revenues and losses are fully integrated.

#### *Additional useful data on Alibaba Group*

- Maggie Wu, Chief Financial Officer of Alibaba Group, made the following comment: "Looking ahead to fiscal year 2020, we expect revenue to be over *RMB*500 billion."
- Adjusted EBITDA 2019 = 121,943 million *RMB* or 18,291 million USD
- Total of 101,958 employees as of March 2019
- Softbank, Yahoo and Mr. Jack Ma are major shareholders of the company.
- Alibaba has acquired Koala for \$2 billion in September 2019, the Chinese e-commerce platform is specialized in luxury goods.

## **6.3.2 Amazon**

Amazon is one of the mightiest brand names in the world and is famous for

its Business-to-Consumer (B2C) activities. Once an internet bookseller, it is now a leading e-commerce retailer with a capitalization that touched the \$1 trillion mark in July 2019. Amazon is also very active in cloud computing (Amazon Web Services or AWS), and nearly 60% of its operating income comes from this segment.

Here are the yearly financial statements of Amazon, errors and omissions excepted (Tables 6.17 and 6.18).

**Table 6.17**Amazon’s balance sheet, \$, in millions, year ended December 31, 2018

Amazon (\$, in millions)	Dec 2018	
32,360 cash and cash equivalents		
3,000 prepaid expenses, prepaid and inv. securities		
5,667 net receivables		
17,284 current liabilities		
2,149 long-term debt		
7,107 intangible assets		
0 net deferred liabilities		
1,500 other liabilities		
0 minority interest		
13,549 total assets		
13,549 total equity		
13,549 total liabilities and equity		

**Table 6.18**Amazon’s income statement, \$, in millions, year ended December 31, 2018

Amazon (\$, in millions)	Dec 2018
32,360 revenue	
9,731 cost of sales	
6,160 gross profit	
6,160 operating, technology and other exp	
81,450 marketing, general and admin expenses	
1,777 interest income and other	
EBITDA	
1,777 interest expense, net	
Income tax	
Minority interest (Non-Controlling Interest or NCI)	
Net income	

EBITDA 2018 is estimated at **\$28,019 million**.

EBITDA 2018 = EBIT + depreciation + amortization = 12,678 + 15,341 = \$28,019 million

*Additional useful data on Amazon*

- Total of 647,500 employees, as of December 2018
- Mr. Jeff Bezos owned 57.6 million Amazon shares, more than 11% of the company, in August 2019 (Securities and Exchange Commission filing, 08/02/2019).

### 6.3.3 Walmart

Walmart is a company of superlatives: It is the largest retailer, the largest employer and the largest holder of retail space in the USA. It faces formidable competitors but does not remain inactive on the world stage (the reader may refer here to Sainsbury/Asda’s merger proposal, Flipkart’s acquisition). Walmart is also pushing its digital shopping and omni-channel retailing called Sam’s Club.

Here are the yearly financial statements for Walmart, errors and omissions excepted (Tables 6.19 and 6.20).

**Table 6.19**Walmart’s balance sheet, \$, in millions, year ended January 31, 2019

Walmart (in millions)	Jan 2019	
47,380 cash and equivalents		
5,890 receivables/CPLTD		
12,360 payables		
70,977 current liabilities		
50,293 current assets		
12,081 deferred taxes and other		
1,056 liabilities		
17,825 interest		
2,496		
7,614 equity		
17,215 liability and equity		

**Table 6.20**Walmart’s income statement, \$, in millions, year ended January 31, 2019

Walmart (in millions)	Jan 2019	
54,405		
685,301 revenue		
120,804 profit		
507,477 marketing, general and admin expenses		
8,651 net income and other losses		
EB806		
11,291 interest exp		
4,281 income tax		
1,500 minority interest		

EBITDA 2018 is estimated at \$24,484 million .

EBITDA 2018 = EBIT + depreciation + amortization = 13,806 + 10,678 = \$24,484 million

*Additional useful data on Walmart*

- 11,300 stores
- Everyday low price (EDLP) and everyday low cost (EDLC)
- 2,200,000 employees or associates (including 700,000 internationally)
- The Walton’s family owns around 50% of the company.
- Exceptional items include \$8.4 billion in losses: \$4.8 billion pre-tax loss (sale of Walmart Brazil) + \$3.5 billion pre-tax decrease in JD.com. This should explain why the forecasted EBITDA increases on a large scale in the following years, in comparison with 2018.
- US sales represent 65% of the total sales
- Walmart has launched a major e-commerce offensive in Asia (e.g., JD.com in China, Flipkart in India, Rakuten in Japan)
- Walmart’s acquisition of Flipkart in India costed \$16 billion

### 6.3.4 Liquidity and Efficiency

Table 6.21 gives an overview of the main efficiency and liquidity ratios applied:

**Table 6.21** Liquidity and non-cash working capital metrics, Dec. 2018 to Mar. 2019

Liquidity and working capital	Amazon	Walmart	Alibaba Group
Current ratio	0.80	0.80	0.80
Quick ratio	0.80	0.80	0.80
Cash ratio	0.00	0.00	0.00
Days of sales (\$, in millions)	61	61	61
Inventory days	46	46	46
Accounts receivable days	40	40	40
Accounts payable days	27	27	27
CWC needs from operations (days)	14	14	14
CWC needs (days)	13	13	13
Inventory as a % of current assets	12	12	12
Receivables as a % of current assets	12	12	12
Inventory as a % of current assets	12	12	12

“Dec. 2018 to Mar. 2019” means December 31, 2018 for Amazon, January 31, 2019 for Walmart and March 31, 2019 for Alibaba.



## ***Formula Used in the Cash Ratio Calculation***

Cash ratio = (cash + cash equivalents) / current liabilities

*The liquidity ratio calculations are outlined below*

- Cash ratio for Walmart =  $7722/77,477 = 10\%$
- Cash ratio for Amazon =  $(31,750 + 9500)/68,391 = 60\%$
- Cash ratio for Alibaba =  $(29,774 + 1978)/31,150 = 102\%$

## ***Formulas and Definitions Used in the Working Capital Calculations***

- Non-cash working capital needs = NCWC needs = current assets – cash – cash equivalents – current liabilities
- 1 day of sales = sales/365 days
- Working capital days = NCWC needs/(sales/day)
- Working capital days from operations = inventories/(sales/day) + accounts receivable/(sales/day) – accounts payable/(sales/day)

*The working capital calculations for Walmart are outlined below:*

- NCWC needs =  $61,897 - 7722 - 77,477 = -\$23,302$
- Sales/day =  $514,405/365 \text{ days} = \$1409/\text{day}$
- Working capital days =  $-23,302/1409 = -17 \text{ days}$
- Working capital days from operations =  $44,269/1409 + 6283/1409 - 47,060/1409 = 31 \text{ days} + 4 \text{ days} - 33 \text{ days} = +2 \text{ days}$

*The working capital calculations for Amazon are outlined below:*

- NCWC needs =  $75,101 - 31,750 - 9500 - 68,391 = -34,540$
- Sales/day =  $232,887/365 \text{ days} = \$638/\text{day}$
- Working capital days =  $-34,540/638 = -54 \text{ days}$
- Working capital days from operations =  $17,174/638 + 16,677/638 - 38,192/638 = 27 \text{ days} + 26 \text{ days} - 60 \text{ days} = -7 \text{ days}$

*The working capital calculations for Alibaba are outlined below:*

- NCWC needs =  $40,541 - 29,774 - 1978 - 31,150 = -\$22,361$
- Sales/day =  $56,527/365 \text{ days} = \$155/\text{day}$
- Working capital days =  $-22,361/155 = -144 \text{ days}$

For Alibaba Group: The amounts of accounts payable and accounts receivable cannot be determined with the account headings provided.

# Findings on Working Capital

These ratios are the perfect illustrations of the three different business models, namely a brick and mortar retail company with a complex supply chain (with 11,300 stores!), an internet Business-to-Consumer (B2C) company with large fulfillment centers, an internet B2B company with no necessary stock to invest (i.e., intermediary business).

The three companies generate large working capital deficits, which is the rule in the retail industry.

It is worth noting that Alibaba generates a non-cash working capital of –\$22 billion, which is equivalent to 144 days’ worth of sales. It is a major source of financing for its operations.

By contrast, Walmart and Amazon have comparable non-cash working capital from operations days but different methods for financing. Walmart has practically no funding tied up in accounts receivable, while Amazon has 26 days’ worth of sales in receivables. Walmart also pay its suppliers more promptly than Amazon.

Amazon benefits from having a “treasure,” its unearned revenue, which represents the equivalent of ten days (6536/638) of sales (i.e., subscription services paid in advance and memberships).

# Another Meaningful Comparison

It is interesting to compare Walmart with another brick and mortar retail group such as the French business Carrefour (Table 6.22).

Table 6.22Walmart against Carrefour’ liquidity ratios, Dec. 2018 to Mar. 2019

Liquidity and working capital	Walmart	Carrefour
Current ratio	0.87	0.87
Quick ratio	0.30	0.30
Cash ratio	0.19	0.19
Days of sales (\$, in millions)	2009	2009
Inventory days	89	89
Accounts receivable days	42	42
Accounts payable days	63	63
WC needs from operations (days)	216	216
WC needs (days)	147	147
Cash as a % of current assets	23%	23%
Receivables as a % of current assets	10%	10%
Inventory as a % of current assets	12%	12%

The two significant differences between these retailers lie in their cash and accounts payable holdings. Carrefour uses its accounts payable as a major source of financing. As a consequence, Carrefour’s relative level of cash is higher, and its debt is lower. If Walmart had the same accounts payable days as Carrefour or Amazon, it would generate massive amounts of cash:

$$1409 \times (68 - 33) \approx \$49 \text{ billion (using Carrefour’s payables days)}$$

$$1409 \times (60 - 33) \approx \$38 \text{ billion (using Amazon’s payables days)}$$

These amounts are approximations as a more accurate calculation would imply using daily COGS instead of daily sales.

Today, Carrefour faces a number of major challenges. It is repositioning itself toward sustainable growth while pushing organic (or green) high margin products.

## Workforce Productivity

Another way to track the global efficiency of a company is to look at the productivity of its “human and intellectual” capital in terms of sales and profit (Table 6.23).

**Table 6.23** Workforce performance , \$, Dec. 2018 to Mar. 2019

Workforce performance in \$	Alibaba Group	Walmart	Amazon
\$17,969,000s			
\$59,876 Employee			
\$638 Employee			

Alibaba’s employees are extremely productive, and its B2B business model and effective e-commerce platforms contribute to its financial success.

It is worth noting that full-time and part-time employees are agglomerated in the total number of employees, and thus the ratio is inaccurate but remains meaningful as the differences are significant.

## 6.3.5 The Debt and Solvency Situation

Here are the main debt ratios applied (Table 6.24):

**Table 6.24** Debt and coverage ratios, \$, in millions, Dec. 2018 to Mar. 2019

Ratio	Walmart	Carrefour	Target
Debt to equity ratio	63%	34%	86%
Debt service coverage ratio	4.1		
Net debt/EBITDA	2		

Formula used: Net debt = total debt (short and long) – (cash + cash equivalents), \$, in millions

*Detailed calculations of the Walmart’s debt ratios*

- Debt to equity ratio (Walmart) = [short + long-term debt (lease obligations incl.) – total cash]/(total equity, NCI included) = (7830 + 50,203 – 7722)/79,634 = **63%** (as of January 2019)
- Carrefour’s debt to equity ratio stands at **34%**, target’s debt to equity ratio at **86%**.
- Debt service coverage ratio (Walmart) = EBITDA /(payment of long-term capital + interest expense) = 24,484/(3784 + 2129) = **4.1** >> 2
- Net debt/EBITDA = 50,311/24,484 = **2** << 5

\$3784 million represent the amount of repayments of long-term debt for the current fiscal year.

# *Findings on the Debt and Solvency Situation*

Walmart’s debt is significant but not excessive , as the company generates enough operating cash to service its debt.

It is worth noting that if long-term operating lease obligations were added to capital lease obligations and debt, the debt to equity ratio would reach 82% as of July 31, 2019. If only capital and finance lease obligations are included, the debt to equity ratio reaches 62% as of July 31, 2019.

Long-term debt was issued in 2018 to finance the Flipkart’s acquisition in India. This will have to be monitored as the legal environment becomes more restrictive in India. Debt to equity ratio stood at 49% one year before.

We use the following metrics for solvency (Table 6.25):

**Table 6.25** Solvency metrics, \$, in millions, Dec. 2018 to Mar. 2019

Solvency	Walmart	Carrefour	Target
Intangible assets	39,660		
Intangible assets, excl. Goodwill	39,660		

All three companies are significantly solvent, well beyond the prudential limits.

### 6.3.6 The Compared Profitability

The enterprise value of the three companies has to be first calculated:

We use the following formula :

$EV = \text{market capitalization} + \text{minority interest} + \text{debt at book value} - \text{cash and cash equivalents}$

Using market capitalization as of August 16, 2019, the EV calculations appear as follows (Table 6.26):

Table 6.26 EV calculations, \$, in millions, August 16, 2019

EV calculation	Alibaba Group	Walmart	Amazon
Market cap	334,560	134,560	334,560
Minority interest	0	0	0
Debt	50,000	50,000	50,000
Cash and cash equivalents	50,000	50,000	50,000
Enterprise Value (EV)	334,560	134,560	334,560

For the net debt, it would preferable to use the latest quarterly publications to update net debt as equity and debt valuation should be measured at approximately the same time. For educational purposes, we keep the same net debt as measured previously.

We concentrate first on EV /sales and EV/EBIT multiples (Table 6.27):

Table 6.27 EV multiples and operating margins

Current EV multiples	Alibaba Group	Walmart	Amazon
EV/sales	6.7x	6.7x	6.7x
EV/margin	66.8x	66.8x	66.8x
EV/EBIT	66.8x	66.8x	66.8x

The EV /sales multiple cannot be properly analyzed without considering the associated operating margin. Alibaba appears expensive in view of its high EV to sales multiple, but its operating margin is ten times higher than Walmart's.

Tables 6.28 and 6.29 give an overview of the projected EBITDA and earnings of the three groups for the next two years.

Table 6.28 Projected EBITDA , \$, in millions

Forward EBITDA	Alibaba Group	Walmart	Amazon
EBITDA 2018			

<del>EBITDA</del> 2019 (projected)			
<del>EBITDA</del> 2020 (projected)			
<del>Growth</del> in EBITDA			

**Table 6.29**Projected earnings, \$, in millions

Forward earnings	Alibaba Group		
<del>Earnings</del> 2018			
<del>Earnings</del> 2019 (projected)			
<del>Earnings</del> 2020 (projected)			
<del>Growth</del> in earnings 2020/2018			

*The forward EBITDA and earnings estimates are based on the following assumptions:*

- Walmart’s growth in earnings = +8400 in 2019 and 2% in 2020 (exceptional items in 2018 = –\$8.4 billion)
- Amazon’s growth in EBITDA = +50%/year in 2019 and +25% in 2020 (real growth in operating income achieved for the six months ended June 30, 2019 = +52.8%)
- Amazon’s growth in earnings = +50%/year in 2019 and +25% in 2020 (real growth achieved for the six months ended June 30, 2019 = +48.6%)
- Alibaba’s growth in EBITDA = +25%/year in 2019 and 2020 (real growth achieved in the quarter ended June 30, 2019, +25%)
- Alibaba’s growth in earnings = +15%/year in 2019 and 2020

## Forward Earnings Methodology

The reader can either estimate the forward earnings independently by using earnings guidance provided by the firm, or can consult excellent internet sites providing low, consensus or high analyst earnings estimates. We can improve forecast quality by computing conservative (low) and aggressive (high) multiples. Here is a non-exhaustive list of prestigious institutions providing financial data and forward earnings estimates: Boursorama, the Financial Times, Handelsblatt, Morningstar, Nasdaq and the Wall Street Journal.

Here is a table depicting the main current and forward profitability ratios (Table 6.30).

**Table 6.30**Main profitability ratios

Alibaba Group			

<i>Current profitability</i>			
<del>ROCE</del> Employees (\$, in millions)			
<del>ROE</del> 2018 (before tax)			
<del>ROE</del> 2018			
<del>EV</del> EBITDA 2018			
<del>P/E</del> 2018			
<i>Forward profitability</i>			
<del>EV</del> EBITDA 2020			
<del>P/E</del> 2020			

Formula used: Adjusted ROE = net income attributable to the parent company (common shareholders of the parent company)/(total equity – minority interest or non-controlling interest).

## ***Formulas Used in the Forward Profitability Calculations***

- Forward EV /EBITDA = current EV /forward EBITDA 2020
- Forward P/E = current share price/forward earnings 2020

### *Detailed calculations for Walmart*

- Forward EV /EBITDA 2020 = 380,009/33,000 = **11.52**
- Forward P/E 2020 = 322,560/15,500 = **20.81**

### *Detailed calculations for Amazon*

- Forward EV /EBITDA 2020 = 868,955/52,500 = **16.55**
- Forward P/E 2020 = 886,710/19,000 = **46.67**

### *Detailed calculations for Alibaba*

- Forward EV /EBITDA 2020 = 460,422/29,000 = **15.88**
- Forward P/E 2020 = 454,580/17,500 = **25.98**

## ***Profitability Findings***

Amazon appears to be a very profitable company when book value ratios are applied (ROCE and ROE ) but less attractive when a market ratio like the P/E ratio is applied. Indeed, its equity valuation seems to be very high. However, Amazon's growth in EBITDA and earnings may justify such a high equity valuation.

Alibaba is well-positioned both on a current and forward perspective.

Walmart has the lowest valuation but also the lowest growth in

EBITDA and recurring earnings.

### 6.3.7 Summary and Final Thoughts

Here is a selection of ratios outlining significant differences between the three retail companies (Table 6.31):

Table 6.31 Selected ratios underlining key differences

Million Group			
Liquidity & working capital			
Curr ratio			
NWC needs (in days)			
Debt to equity			
Net debt < 0			
Workforce performance			
Payroll per employee in US\$			
Current profitability			
EV/EBIT			
Forward profitability			
EV/EBITDA 2020			
P/E 2020			

### Quantitative and Qualitative Comments

These great companies have solid credentials and credibility:

- Amazon seems to be priced for perfection, even if it’s forward EV to EBITDA multiple looks reasonable. The company must continue to grow sales at an exponential rate in its diversified segments (i.e., AWS) and the company should continue to invest heavily in Artificial Intelligence (AI) and in “Phygital” marketing (e.g., amazon go stores).
- Alibaba seems to have potential and could turn out to be Amazon’s number one competitor. Its home market is China, and the “Middle Kingdom” has established a highly competitive e-commerce ecosystem; companies such as JD.com or Pinduoduo may threaten and at the same time force Alibaba to be even more competitive. Questions remain as to where and how the company will be listed in the future (New York Stock Exchange and/or Hong Kong Stock Exchange, following the November 2019 IPO), on the consequences of the US trade war on China and the fate of the company without Jack Ma, its charismatic co-founder?
- Walmart looks inexpensive relative to Amazon, but the company carries



some debt and is less diversified than the other two digital giants. Walmart may however succeed in the convergence of its offline and online retail services.

## *Final Thoughts*

A value or defensive investor would most likely choose Walmart, while a growth investor would likely have some hesitation between Amazon and its challenger Alibaba. Geopolitics may provide proper guidance for the future, perhaps even more than business models.

Europe and key emerging countries such as India and Russia represent future battlefields for the three giants. Attacking the Chinese or US market head on is an immense task with high barriers to entry.

In the meantime, the US “delivery battle” has started: Amazon Prime’s one day shipping versus free NextDay delivery at Walmart. In the meantime, the US “video streaming battle” has also started: Amazon, Apple and Disney may prove to be formidable Netflix’s competitors. The huge investments required will affect Amazon’s profitability as in Q3, 2019.

### **Case Study Limitations: Alibaba, Amazon and Walmart**

This purpose of this comparison is not so much the opinions of the author regarding these companies at the time of writing (market capitalization as of August 16, 2019), **but the way ratios were implemented and the methodology used.** Many positive or negative events such as changes in technology, a rising competitor, a new legal framework, even a recession may upend the present situation. Ratios are powerful tools at your disposal, and an up-to-date analysis in the current environment will be the foundation of your personal investment thesis.

In the next chapter, we will define an investment thesis and examine its implementation at the three companies.

## **References and Further Reading**

Anthony, Robert N., and James S. Reece. 1989. *Accounting: Text and Cases*. Irwin.  
Accounting: Text and Cases, Robert N. Anthony, David F. Hawkins, Kenneth A. Merchant, 2010, McGraw-Hill Higher Education.

Coulon, Yannick. January 2017. *Guide pratique de la finance d'entreprise*. Gualino.

———. September 2018. *L'essentiel des ratios financiers*. Maxima Laurent du Mesnil.

Jones, Bill, Terry Jones, Theo Kocken, and Ben Timlett. March 2016. *Boom Bust Boom*. TV Documentary (USA).

Minsky, Hyman P. 2008. *Stabilizing an Unstable Economy*. McGraw-Hill.

Quiry, Pascal. Le Fur Yann, 2019, *Finance d'entreprise 2020* de Pierre Vernimmen, Dalloz.

Stowe, John D., Thomas R. Robinson, Jerald E. Pinto, and Dennis W. McLeavey. August 2002. *Analysis of Equity Investments: Valuation*. AIMR and CFA Institute.

Thauvron, Arnaud. 2013. *Evaluation d'entreprise*. 4th ed. Paris: Economica.

Thibierge, Christophe. November 2013. *Comprendre toute la finance*, 2ème édition. Vuibert.

Walsh, Ciaran. 2008. *Key Management Ratios*, 4th ed. Financial Times Series. FT Prentice Hall. Pearson Education Limited.

## Webography

[www.alibabagroup.com](http://www.alibabagroup.com) (Investor Relations).

[www.amazon.com](http://www.amazon.com) (Investor Relations).

[www.nasdaq.com](http://www.nasdaq.com) (AMZN, BABA, WMT).

[www.walmart.com](http://www.walmart.com) (Investor Relations).

## Balance Sheets

Alibaba Group, Fiscal Year 2019 Results (Year Ended March 31, 2019), May 15, 2019.

Amazon 2018 Report (Year Ended December 31, 2018), January 31, 2019.

Carrefour, Consolidated Financial Statements as of December 31, 2018.

Walmart, Defining the Future of Retail, 2019 Annual Report (Year Ended January 31, 2019), April 23, 2019.

# 7. Investment Thesis

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## Abstract

The implementation of ratios is useless if applied irrationally. As a consequence, the principles behind an investment thesis are outlined, adding a touch of behavioral finance to counter investment biases.

Possible investment theses for Alibaba, Amazon and Walmart illustrate the concept.

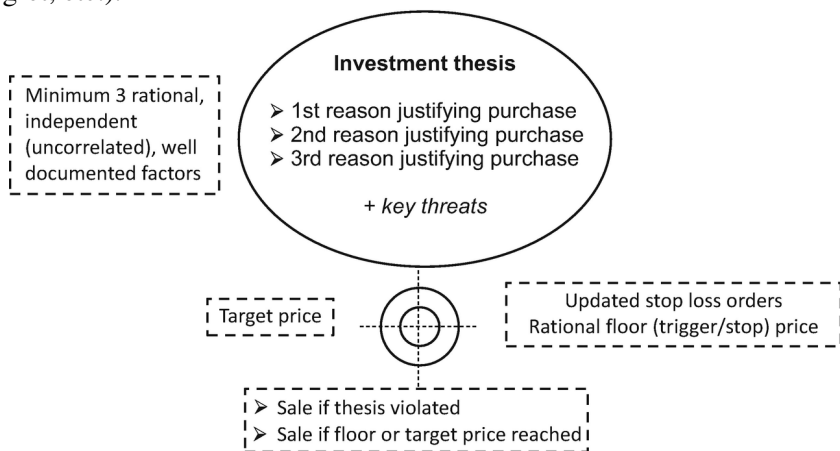
The key behavioral biases then conclude the chapter.

**Keywords** Behavioral finance Behavioral biases Investment thesis Target price Rational investing

## 7.1 Definition of an Investment Thesis

A documented investment thesis (Fig. 7.1) allows investors to scrupulously articulate the justification for a stock purchase, rationalizing the investment process. Such a thesis sets target prices and automates the selling process, allowing investors to benefit from stop loss orders. Furthermore, it reduces the emotional side of investing, enabling investors to avoid the pitfalls of the disposition effect or other behavioral biases (e.g., loss aversion, fear of

regret, etc.).



**Fig. 7.1** Investment thesis methodology

### ***The Thesis Violated***

If one or more of the essential reasons for the rational purchase of a stock is eliminated, the sale of the stock should follow. The human mind is resourceful: it will replace invalid reasoning with remarkable ease. However, other biases will come into play and may quickly lead to the status quo. With a written thesis, it is more difficult to falsify the original thought process, and thus the sale becomes necessary and rational.

The example below may help explain this idea:

The investor considers the key factor in the investment decision to be the founding owner of the company, namely a man or woman of great value and management experience. If this person were to leave the company, its sale would be logical and coherent with the purchase thesis, even if the company excels in outlining the merits of a successor. Even though the investor might be tempted by this line of argument, the thesis remains violated: the essential reason that justified the purchase now substantiates the sale.

### ***The Floor Price***

The floor (trigger or stop) price is an important threshold because it conditions and automates the sale, limits potential loss and excludes loss aversion bias. When placing a stop loss order, the floor must be set well below current market price to avoid unintended selling due to normal daily volatility.

The ability to sell at a loss allows the investor to avoid the dangerous

game of averaging down. It is best not to increase exposure even after a short price fall. This simple “correction” may prove to be the beginning of a long-term bearish move.

### ***Independent and Measurable Factors***

The factors justifying an investment must be independent, as in uncorrelated. For instance, the ability of a company to achieve both exponential growth and high profitability in its niche market is probably equivalent to one single argument. A company that controls a niche market (exponential growth) is usually very profitable. This correlation weakens and undermines the investment thesis by reducing the number of compelling reasons justifying the purchase of the stock.

Qualitative factors can be tricky when they are subjective and non-measurable. For example, selecting a company because of its “charismatic” chief executive officer (CEO) may be too limited and even problematic if the CEO is also unethical, inefficient, egocentric or stubborn.

## **7.2 Benefits of an Investment Thesis**

A simple scenario here illustrates the benefits of disciplined and rational investment decisions, which limits the effect of behavioral biases: An innovative company has launched a revolutionary product in a niche market. Two investors decide to buy 1000 shares valued at \$100 each, for a total investment of \$100,000.

The first investor, Mr. Hyde (our impatient investor), has little stock market experience and yet believes that he instinctively understands financial matters. He thinks that this company has a bright future.

The second investor, Mr. Jekyll (our patient investor) shares the same strong view on the company. He sets a target price of \$190 and a floor price at \$80, limiting its maximum loss to 20% per stock.

### ***First Quarter Results (\$90)***

In the first quarter, the company announces a sales figure lower than market expectations and its stock price drops by 10% to \$90.

- Mr. Hyde seizes the opportunity to increase his holdings by 1000 additional shares; his average purchase price is now \$95.

- Mr. Jekyll decides to do nothing; he will reconsider his position at the end of the following quarter.

### ***Second Quarter Results (\$80)***

Three months later, the company announces another quarterly sales figure below market expectations but slightly higher than the first quarter, and its stock price drops further to \$80.

- Mr. Hyde is perplexed, and he begins to regret his purchase of additional stock.
- The “stop loss” order that was placed earlier by Mr. Jekyll is executed, and his holdings are automatically sold at \$80. He considers the reasons for such disappointing results: Is it a marketing or a delivery problem? He has read on different technical forums that the product remains popular among users and therefore chooses to remain informed regarding the fate of the company.

### ***Third Quarter Results (\$50)***

In the third quarter, the company is still behind schedule and its stock price plummets to \$50. The company announces that problems related to delivery and quality for a critical part have slowed production, but the company has contacted a second potential supplier and is optimistic about its next steps. Potential demand remains strong, and the company claims that the manufacturing problem will be solved just before the end of Q4.

- Mr. Hyde seriously questions the company’s decisions and concludes that he was simply unlucky. “When the stock price goes back to my purchase price,” he thinks, “I will get rid of this dumb share.” He places a sell limit order at \$95.
- Following this announcement, Mr. Jekyll finally understands why sales have not been satisfactory. The success of the product is not in question, and it seems to be well received by the market. Before the end of the quarter, he repurchases 1000 shares at \$50 and sets another maximum loss of 20%, for a stock price of \$40. He maintains his target price at \$190.

### ***Fourth Quarter Results (\$130)***

In the fourth quarter, sales explode and the stock price soars to \$130.

- Mr. Jekyll decides to buy an excellent bottle of wine from Bordeaux.
- Mr. Hyde’s holdings are automatically sold at \$95. His initial investment is recovered.

## ***Summary***

- Mr. Hyde's successive operations end up with no loss:  $(-1000 \times 100) + (-1000 \times \$90) + 2000 \times \$95 = 0$ . However, he is quite frustrated by his experience, especially as he watches the stock climb from \$95, his selling price. Instead of having profits, he has accumulated regret since then.
- Mr. Jekyll's portfolio shows a position valued at \$130,000. Its paper profits reach \$60,000 (i.e.,  $-20,000 + 80,000$ ). He readjusts the floor upwards to \$105 and maintains his target price of \$190.

This example demonstrates how Mr. Jekyll's strategy allowed him to quietly exit the market with a limited loss that was consistent with his initial plan. He reinvested rationally at a low share price and remained invested even after the sharp price rise in Q4. The discipline attached to his investment decisions allowed him to avoid falling into the traps of the disposition effect (and other psychological biases).

## ***Closing Remarks on the Scenario***

It is not uncommon for a young company to fail in its initial sales forecasts and poorly manage its first manufacturing cycle. In the 1990s, I experienced a similar situation with Iomega Corp, where I was European product manager of the Zip drive. We encountered a manufacturing problem during the launch of the product, but it was so innovative that demand remained strong for years.

Kim Edwards, Iomega's CEO, expressed the following motto: "Give the customer what he wants, when he wants it, at the price he is willing to pay." The success was considerable, and the Nasdaq-listed Iomega share went from less than \$10 in 1994 to over \$110 in 1996. It only declined following market shifts from the advent of rewritable compact disks (CDs) and Universal Serial Bus (USB) memory sticks.

There is no miracle approach to financial investment. The investment thesis is a pragmatic tool, among others. Each investor must make his or her own independent decisions.

## **7.3 Possible Investment Theses**

# for Alibaba, Amazon and Walmart

Investors must create their own investment theses based on their analyses, expectations, investment horizons and risk profiles.

Here are some possible investment theses for the three retail companies. They are presented as pure illustrations of what an investment thesis should look like (Figs. 7.2, 7.3, and 7.4).

## Alibaba group

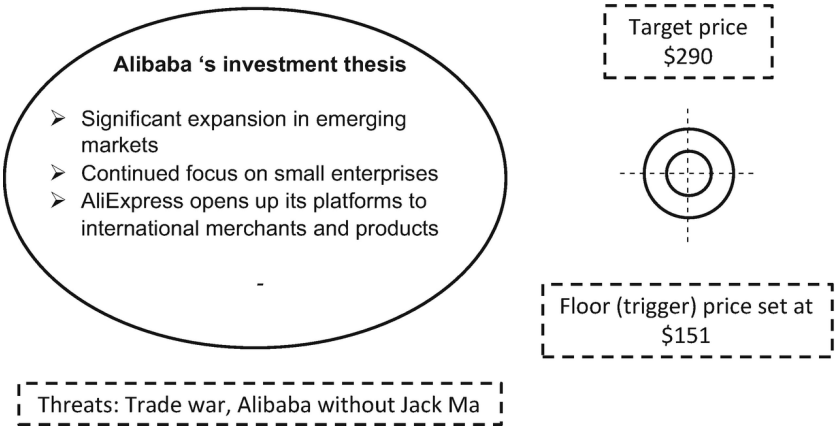
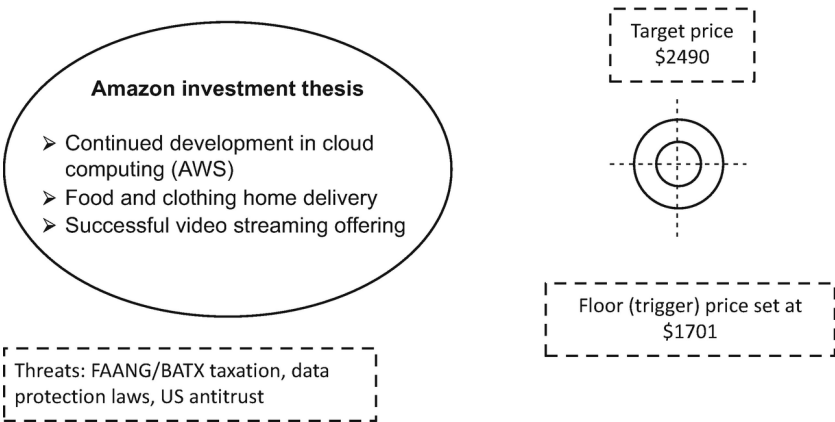


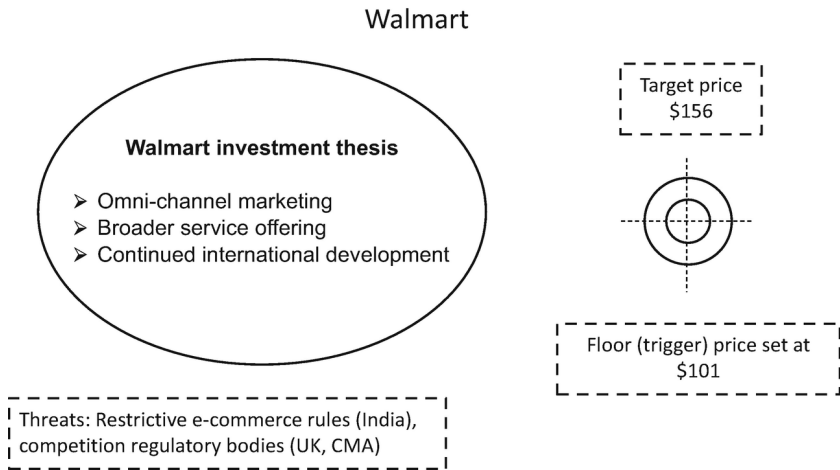
Fig. 7.2 Example of an investment thesis for Alibaba

## Amazon





**Fig. 7.3**Example of an investment thesis for Amazon



**Fig. 7.4**Example of an investment thesis for Walmart

#### *Example of a target price setting*

Let us take the case of Walmart:

If the forward enterprise value (EV) multiple of Walmart (12) were to converge toward an average EV multiple of 15 (an ambitious goal) :

- Target EV multiple Walmart = 15
- EV multiple Walmart = target EV/projected EBITDA (Earnings before Interest, Taxes, Depreciation and Amortization)
- Target EV =  $15 \times 33,000 = 495,000$  (\$, in millions)
- Target market capitalization = target EV – net debt =  $495,000 - 50,000 = 445,000$  (\$, in millions)
- Potential growth = target/current market capitalization =  $445,000/322,560 = 1.38$  (i.e., + 38%)
- Target price =  $113$  (price of Walmart stock as of August 16, 2019)  $\times 1.38 = \$156$

The target price could be set at \$156.

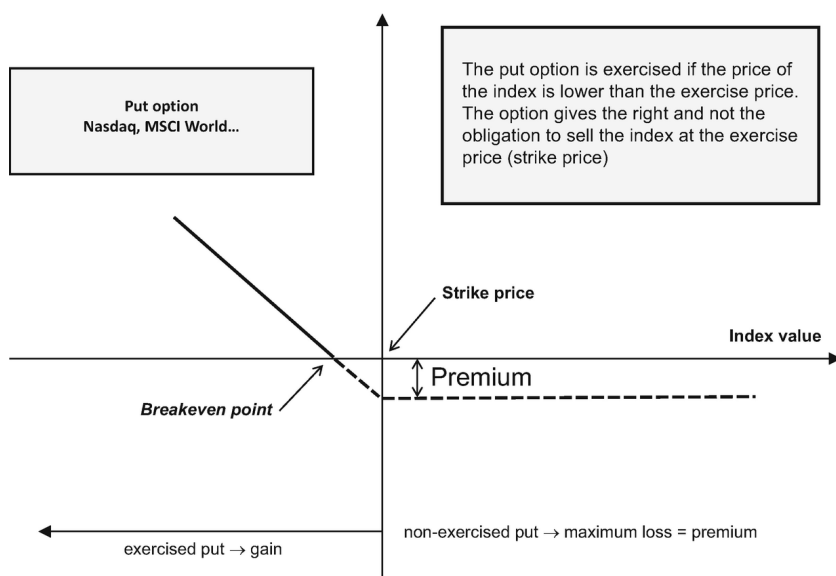
Setting the floor price depends on the maximum loss capacity of an investor; this could also potentially depend on technical analysis. Each investor has a different risk profile and will set their own individual floor. A floor at \$101 represents a potential loss of roughly 10%. Stop loss orders are not without execution risks: a stop loss order does not mean that the selling price will be \$101, but that it will be transformed into a market

order when the price drops below the \$101 limit. It would be wise to avoid “obvious” limits (which in this example are at \$99 or \$100) that may be instituted by too many investors, causing higher market volatility and risk, if this \$99 price is reached.

## 7.4 Market Hedging

Choosing the best stock within a sector along with a well-defined investment thesis is not a guarantee for absolute performance. If the sector or the overall market is strongly bearish, there is a high probability that even the best in class stock will follow suit. To hedge against a significant market decline in case of a recession or sector rotation, buying (not selling!) an index put option could be a good strategy (market or sector hedging). The maximum loss is the premium paid to buy the option. The higher the strike price (i.e., the value of the index), the further out the expiration date, the higher the volatility and the higher the cost of the option (Fig. 7.5).

Index put option payoff diagram



**Fig. 7.5** Index put option

Hedging is also possible with the purchase of short equity ETFs such as the ProShares Short QQQ (Nasdaq 100 Index) or the Lyxor EURO STOXX

50 (i.e., 50 largest capitalizations in the eurozone) Inverse ETF ETF (i.e., Exchange Traded Fund). Hedging takes place when the investor owns the underlying or correlated asset. If not, this is defined as short selling and therefore speculation.

When hedging is used as a tactical tool, it is useful when markets are still rising and less effective when markets have fallen, and fear is high. Timing is key and successful hedging is often contrarian.

## 7.5 Selection of Damaging Behavioral Biases

Behavioral biases may prevent sound investment decision making. It appears useless to analyze and use ratios if the final decision is irrational! Let us therefore introduce several key biases and see how they negatively impact business decisions.

The famous names in behavioral finance, including Daniel Kahneman, Amos Tversky, Werner de Bondt, Richard H. Thaler, Hersh Shefrin and Meir Statman, mention these biases in their respective anthologies, supported by numerous experiments and empirical studies.

Here is a list of the most common biases resulting in poor portfolio performance:

### ***Anchoring***

Anchoring describes the singular focus of an investor on the initial purchase price of an asset. This historical price serves as an absolute reference point and becomes “the price” of the asset, even if the market has evolved and today tells a different story. This single-mindedness on the initial price paves the way for poor reasoning and rash decision making.

### ***Availability Bias***

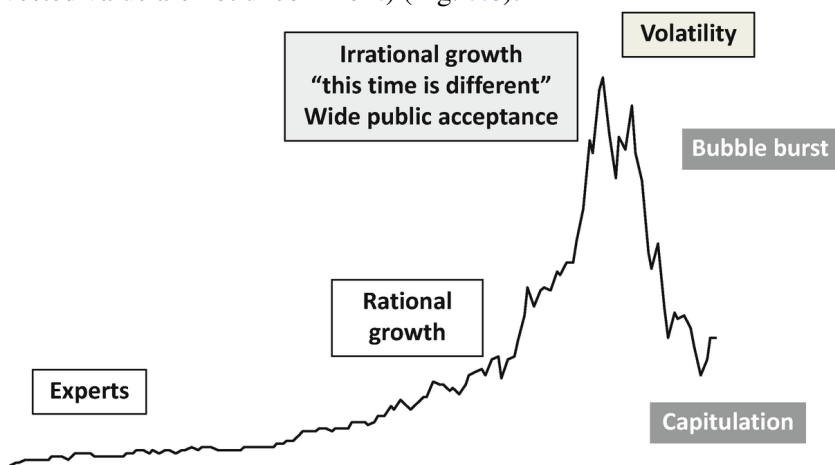
The most salient, recent or available information influences the immediate decision at the expense of information that is less accessible, less traumatic or impressive, older and often more relevant. Investors can thus extrapolate recent past performance and follow the herd, becoming passive followers of a trend.

### ***Confirmation Bias***

The investor ignores or downplays any message that contradicts his

purchase decision. To the contrary, he amplifies the elements that confirm it. As a result, he may interpret any market fall as a simple correction, or even assess it as an opportunity to increase his holdings, failing to consider the possibility of a long-term market downturn.

Confirmation bias sometimes leads one to think that cautious approaches have a hidden agenda. Negative arguments, even rational, may be read as “fake news.” This loss of objectivity can persist months after the burst of a financial bubble. Capitulation is the last stage of the process, when shares are finally sold at massive losses (losses of up to 90% of invested value are not uncommon!) (Fig. 7.6).



**Fig. 7.6** Different phases of a bubble

### ***The Last Phase of a Bubble Before It Bursts***

Who wants to play the role of Cassandra?

It is advantageous to consult Greek mythology and invoke the tragic destiny of Cassandra. Cassandra, daughter of Priam, king of Troy, and desired by the god Apollo, was endowed with the gift of prophecy. Having refused Apollo as a lover, he took his revenge, and Cassandra was condemned to be forever disbelieved in her predictions. She was rejected and considered to be insane when she predicted that the city of Troy would fall into the hands of the Greeks, who had come to deliver Helen in an epic siege that led to the fall of the city.

Similarly, it is extremely difficult to be heard and believed when you try to warn of a potential bubble, particularly when the whole world wants to hear that the bullish movement of the market will continue for a long time and that easy money has no end. For example, as a bank executive during the boom years of the internet bubble in the late 1990s, I

participated in a road show to present our technology investment fund. The management style of the fund was value creation when most internet companies had no track record of regular profits.

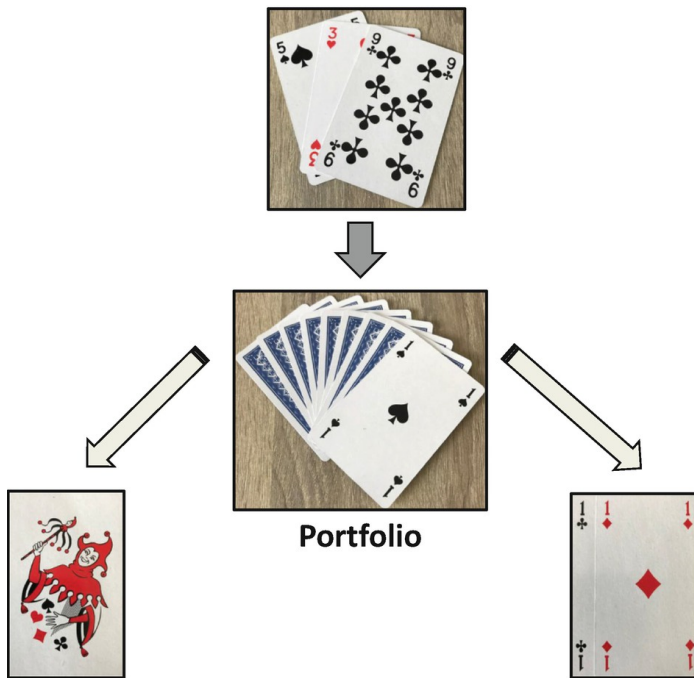
Following our intrinsic value principle, our fund manager had logically and massively underweighted these internet securities, and as a consequence the fund was strongly underperforming within the tech market. Some of our customers complained about the weak performance of the fund and questioned our position. For these clients, we were perceived as excessively cautious managers, whereas the future has shown that this prudence was perfectly justified.

This example illustrates that rational players can find themselves in a delicate position in a speculative market. They will either become followers or suffer from massive underperformance and criticism. It is not easy to swim against the tide and oppose the thought process that leads to the formation of a bubble. Like Cassandra, they experience the tragic destiny of never being popular.

This psychological metaphor on Cassandra was used by Gaston Bachelard in 1949 in his book “Le rationalisme appliqué.” Rationalism has been under attack for decades.

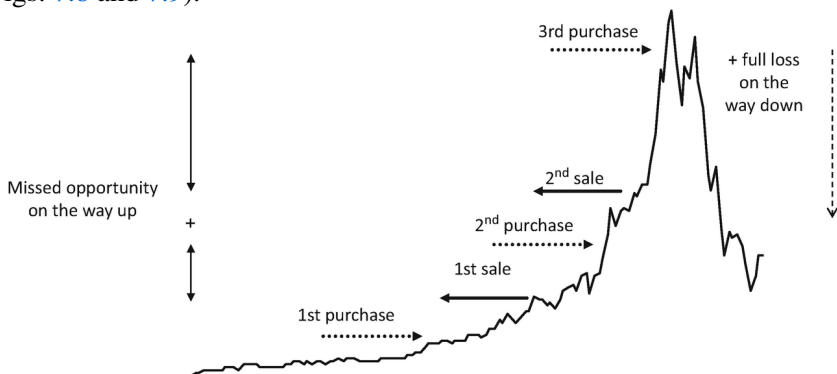
### ***Disposition Effect***

First developed and researched by Hersh Shefrin and Meir Statman, the disposition effect is the tendency to sell securities with paper gains too quickly and hold securities with paper losses for too long. We stick with our losers and we discard our winners by quickly cashing out small capital gains. This negative effect is reinforced by the reality that winners are often replaced by losers (past performance chasing), which creates a very negative dynamic in terms of portfolio performance (Fig. 7.7).

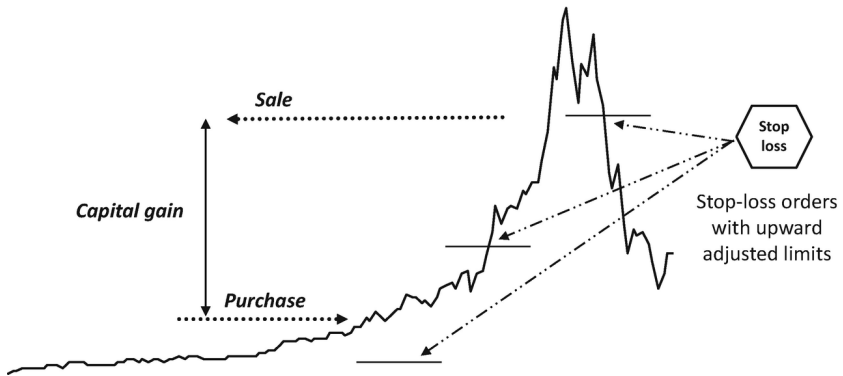


**Fig. 7.7**Disposition effect: bad cards (past winners) replacing jokers and aces (future winners)

The disposition effect disastrously impacts portfolio performance. The investor does not fully benefit from a rising market (multiple trades with low capital gains) but will suffer the full loss when the market plummets (Figs. 7.8 and 7.9).



**Fig. 7.8**Disposition effect in action

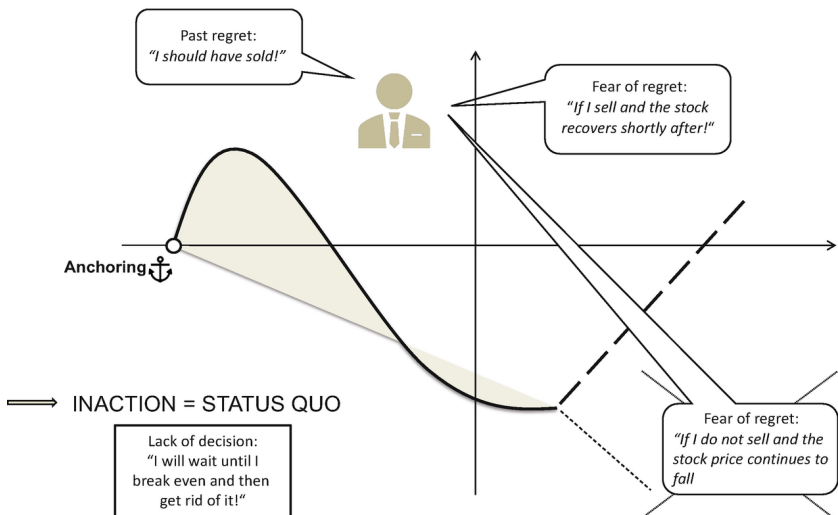


**Fig. 7.9** “Neutralized” disposition effect

### ***Fear of Regret***

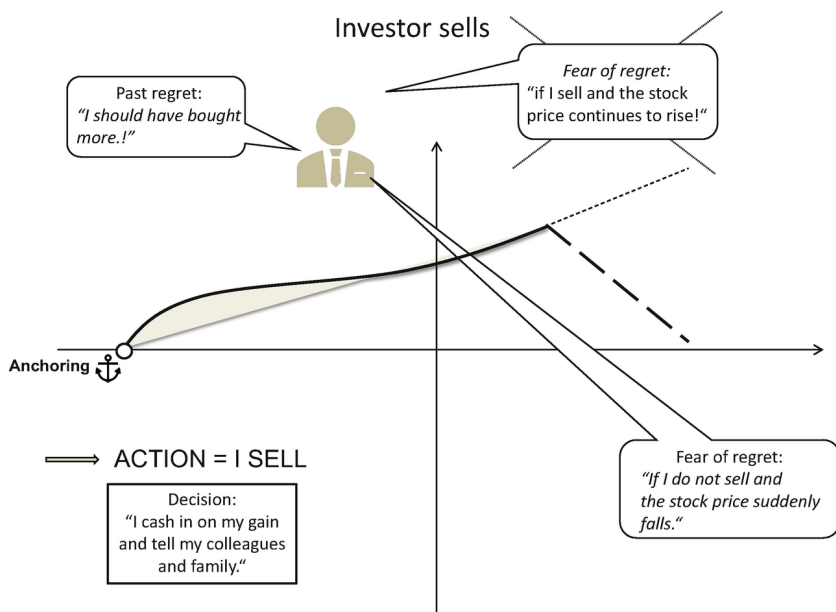
Fear of regret is the anticipated regret that an investor might feel if he were to sell a stock at a loss. He will retain it in the hope of breaking even. This fear is not to be confused with the feeling of regret following a realized sale, which may exclude the sector from the scope of future possible investments, another attack on the principle of diversification (Fig. 7.10).

Investor does not sell



**Fig. 7.10** Fear of regret in favor of inaction

Fear of regret is also an anticipated regret that an investor might feel if he were not to sell a winning stock at the right time (Fig. 7.11).



**Fig. 7.11** Fear of regret in favor of “selling”

### **Home Bias**

Companies in our native country, whose names are familiar to us, may appear better managed and thus a safer haven than foreign companies. This belief, however, undermines the principle of diversification: proximity provides a sense of security, but over-investing in a single market actually increases risk.

### **Loss Aversion**

It is extremely difficult for an investor to mentally process the liquidation of a position in the red, even though the recovered capital will be available for a new promising investment. A delayed decision on the sale very often leads to an even more subsequent loss in the future.

Turning a paper loss into a real loss is a difficult psychological step, thus the investor hopes for the best and waits for a price turnaround. If the price were to ascend to the initial purchase price, he would divest without hesitation. Furthermore, because the investor does not want to live with this sentiment of failure and regret, he may attempt to save face by portraying his advisor as unwise or pretending he, as an investor, was unlucky (i.e., lack of luck or competence?).

### **Mental Accounting**



Mental accounting was first developed and researched by Richard H. Thaler, who received the Nobel Prize for Economics in 2017.

It is rare to find an investor who can take a global view of his financial wealth. Instead, his vision is fragmented and limited in scope, and each financial operation and decision is assigned to a specific mental account. The human brain easily analyzes an isolated item; but encounters greater difficulty when processing a set of interrelated events. The fundamental principle of diversification is thus undermined.

A negative mental account (e.g., a falling share in a portfolio), becomes a “dead” line! Eliminating it by accepting the loss and liquidating the position can be a challenging task.

### ***Patience and Impetuosity***

In the mind of each investor dwells a Dr. Jekyll and a Mr. Hyde. Wisdom and patience are in constant struggle against “short-termism” and impulsivity. For example, the instantaneous low price market order on our smartphone seems to rule over long-term investing?! This is reinforced by a negative interest rate environment that punishes long-term savers. This is almost a philosophical debate! (Fig. 7.12).

Doctor Jekyll

*Patience*



✓ Value investor with a long-term horizon

and Mr Hyde

*Impatience*



✓ “Addicted” investor, short term oriented, follower, impulsive, intensive trader

**Fig. 7.12** Patient and impatient investor

### ***Reversion to the Mean Bias***

A rising share will eventually reverse its trend and revert to its average position. A quick sale after a short series of price increases may therefore appear relevant and rational. This commonsense tactic is however contradicted by the reality of markets. A bull market lasts several years, and a bear market follows the same pattern. Therefore, the trend reversal will definitely occur, but it may take place over a much longer time horizon than the one adopted by an impatient investor.

Popular stock quotes: “Do not fall in love with your stock” and “Trees

do not grow to the sky” may be valid for the very long-term, but not the short or medium term. “Never try to catch a falling knife” may be valid for the short and medium term, but not the long-term.

### ***Sunk Cost Fallacy***

This bias leads to decisions to accept the status quo instead of choosing alternative projects. This choice privileges the costs and efforts already incurred in a project over the acknowledgment of new environmental conditions. In this case, the decision maker cannot put aside the time, money and effort invested, opting for the continuation of an older investment project even when an efficient alternative has emerged. Accepting this loss and therefore the new project would however allow real cost savings.

The sunk cost fallacy is also known as the “Concorde fallacy” in reference to the Franco-British supersonic commercial aircraft.

## **7.6 Key Takeaways on Investment Thesis**

The investment thesis is comprised of the main reasons justifying an investment. It sets a target price and a floor price, allowing an investor to disinvest in a timely and rational manner. For example, if the thesis is violated, the investment must be sold.

This disciplined approach will help an investor avoid some of the most harmful behavioral biases. The portfolio performance may be, as a result, dramatically enhanced.

### ***Limitations***

The factors for justification must be unrelated and uncorrelated.

The investment thesis must be properly documented and not altered by short-term considerations.

There is no miracle solution to successful investing. The list of behavioral biases is large and multifaceted.

# References and Further Reading

Bachelard, Gaston. 1949. *Le rationalisme appliqué*. Paris: Presses universitaires de France.

Barber Brad, M., and Odean Terrance. November/December 1999. The Courage of Misguided Convictions. *Financial Analysts Journal* 55 (6): 41–55.

[Crossref](#)

Coulon, Yannick. March 2016. *Guide pratique de la finance comportementale*.

Gualino: Côté finance.

———. September 2018, *L'essentiel des ratios financiers*. Maxima Laurent du Mesnil.

Fox, Justin. 2009. *The Myth of the Rational Market, a History of Risk, Reward, and Delusion on Wall Street*. Harper Business.

Haldane, Andrew. September 2010. *Patience and Finance*. Beijing: Oxford China Business Forum.

Jones, Bill, Jones Terry, Kocken Theo, and Timlett Ben. March 2016. (USA). *Boom, Bust, Boom*. TV Documentary.

Kahneman, Daniel, and Tversky Amos. 2000. *Choices, Values, and Frames*. Russell Sage Foundation. Cambridge University Press.

Kindleberger, Charles P. 2005. *Manias, Panics, and Crashes, A History of Financial Crises*, 5th ed. Wiley.

Shefrin, Hersch. 2002. *Beyond Greed and Fear*. Financial Management Association Survey and Synthesis Series, Oxford University Press.

Shefrin, Hersch, and Statman Meir. July 1985. The Disposition to Sell Winners Too Early and Ride Losers Too Long: Theory and Evidence. *Journal of Finance*. Wiley.

Shiller, Robert. 1998. *Human Behavior and the Efficiency of the Financial System*. NBER Working Paper Series. National Bureau of Economic Research, Inc.

Solnik, Bruno. 1988. *International Investments*. Addison Wesley Longman Publishing Co.

Stevenson, Robert Louis. 1886. *Strange Case of Dr. Jekyll and Mr. Hyde*. London: Longmans, Green and Co.

Thaler, Richard H. 2005. *Advances in Behavioral Finance*, Vol. II. Russell Sage Foundation, Princeton University Press.

# Appendix: List of Key Ratios

## A Selection of Key Financial Metrics (Chap. 1 )

Table A.1Key financial metrics

<del>NCWC</del> <del>Net working capital</del> (excluding cash) – current liabilities	
Working capital = current assets – current liabilities	
Working capital = long-term capital – long-term assets	
<del>FCE</del> <del>Free cash flow</del> = EBITDA <del>adjusted</del> taxes – net investments in NCWC – net investments in capex	
<del>FCE</del> <del>Free cash flow</del> = EBITDA <del>adjusted</del> taxes – net interest – net investments in NCWC – net investments in capex + net borrowing	
<del>EM</del> <del>Enterprise value</del> (incl. minority and book value of debt) – cash	
<del>EM</del> <del>Enterprise value</del> (incl. minority and book value of debt) – market value of debt and other financial obligations + market value of minority interest (NCI) – market value of non-core assets (incl. excess cash)	

## A Selection of Efficiency Ratios (Chap. 2 )

Table A.2Key efficiency ratios

<del>Inventory</del> (days) <del>average</del> inventory		
COGS/365 days or <i>net</i> sales/365 days		
<del>Accounts receivable</del> (days) <del>average</del> receivable		
<i>Net</i> sales/365 days		
<del>Accounts payable</del> (days) <del>average</del> payable		
Purchases/365 days		
<del>Inventory</del> turnover		
Inventory days		
<del>Accounts receivable</del> turnover		
Accounts-receivable days		
<del>Accounts payable</del> turnover		
Accounts-payable days		
<del>Sales per</del> employee		
Number of employees		

Profit per employee Number of employees		
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# A Selection of Liquidity and Solvency Ratios (Chap. 3 )

Table A.3 Key liquidity and solvency metrics

<del>Current ratio</del> Current assets Current liabilities >> 1		
<del>Quick ratio</del> Current assets – inventories Current liabilities ≥ 1		
<del>Cash ratio</del> Cash and equivalents Current liabilities > 0.5 → 1		
<del>Solvency</del> Net worth > 0		
Total asset – Total liabilities > 0		
Equity > 0		
<del>Tangible solvency</del> Tangible net worth > 0		
Total assets – Intangibles – Total liabilities > 0		
<del>Market solvency</del> Market price > total liabilities + off-balance sheet obligations		
<del>Equity to asset ratio</del> Equity Total assets >> 20%		

# A Selection of Debt and Leverage Ratios (Chap. 4 )

Table A.4Key debt ratios

<del>Debt/equity ratio</del> Debt Equity		
<del>Debt/enterprise value ratio</del> Debt Enterprise value		
<del>Debt/EBITDA service coverage ratio</del> Debt service		
<del>Interest coverage ratio</del> EBIT Interest expense		
<del>Debt/EBITDA ratio</del> Debt EBITDA		

# A Selection of Profitability and

# Performance Ratios (Chap. 5 )

Table A.5 Key profitability ratios

$\frac{\text{EBIT}}{\text{Sales}}$		
$\frac{\text{Price to book ratio (P/B or P/BV)}}{\text{Book value per share}}$		
$\frac{\text{ROA}}{\text{Total assets}}$		
$\frac{\text{ROCE (EBIT)} \times (1 - \text{tax rate})}{\text{Capital employed}}$		
$\frac{\text{ROE}}{\text{Equity}}$		
$\frac{\text{Dividend yield}}{\text{Market value per share}}$		
$\frac{\text{Earnings yield}}{\text{Market value per share}} = \frac{\text{Net income}}{\text{Market capitalization}}$		
$\frac{\text{P/E}}{\text{Earnings per share}} = \frac{\text{Market capitalization}}{\text{Net income}}$		
$\frac{\text{PEG}}{\text{Expected EPS growth}}$		
$\frac{\text{EV/EBITDA}}{\text{EBITDA}}$		
$\frac{\text{EV/EBIT}}{\text{EBIT}}$		
$\frac{\text{EV/sales value}}{\text{Sales}}$		

## General Bibliography, Webography and Further Reading

Anthony, Robert N., and James S. Reece. 1989.*Accounting: Text and Cases* . Irwin.

Bachelard, Gaston. 1949.*Le rationalisme appliqué* . Paris: Presses universitaires de France.

Barber Brad, M., and Odean Terrance. November/December 1999. The Courage of Misguided Convictions.*Financial Analysts Journal* 55 (6): 41–55.

Coulon, Yannick. March 2016.*Guide pratique de la finance comportementale* . Gualino: Côté finance.

———. January 2017.*Guide pratique de la finance d'entreprise* . Gualino: Côté finance.

———. September 2018.*L'essentiel des ratios financiers* . Maxima Laurent du Mesnil.

DeChesare, Brian. 2017. Equity Value, Enterprise Value, and Valuation Multiples – Written Guide (PDF).*Breaking Into Wall Street* .

Fox, Justin. 2009.*The Myth of the Rational Market, a History of Risk, Reward, and Delusion on Wall Street* . Harper Business.

Haldane, Andrew. September 2010.*Patience and Finance* . Beijing: Oxford China Business Forum.

Jones, Bill, Jones Terry, Kocken Theo, and Timlett Ben. March 2016. (USA).*Boom, Bust, Boom* . TV Documentary.

Kahneman, Daniel, and Tversky Amos. 2000.*Choices, Values, and Frames* . Russell Sage Foundation, Cambridge University Press.

Kindleberger, Charles P. 2005.*Manias, Panics, and Crashes, A History of Financial Crises* , 5th ed. Wiley Investment Classics.

Minsky, Hyman P. 2008.*Stabilizing an Unstable Economy* . McGraw-Hill.

Quiry, Pascal. 2019.*Le Fur, Finance d'entreprise 2020 de Pierre Vernimmen* . Dalloz.

Shefrin, Hersch. 2002.*Beyond Greed and Fear* . Financial Management Association Survey and Synthesis Series. Oxford University Press.

Shefrin, Hersch, and Statman Meir. July 1985. The Disposition to Sell Winners Too Early and Ride Losers Too Long: Theory and Evidence. *Journal of Finance* . Wiley.

Shiller, Robert. 1998.*Human Behavior and the Efficiency of the Financial System* . NBER Working Paper Series. National Bureau of Economic Research, Inc.

Solnik, Bruno. 1988. International Investments. Addison Wesley Longman Publishing Co.

Stevenson, Robert Louis. 1886.*Strange Case of Dr. Jekyll and Mr. Hyde* . London: Longmans, Green and Co.

Stowe, John D., Thomas R. Robinson, Jerald E. Pinto, and Dennis W. McLeavey. August 2002.*Analysis of Equity Investments: Valuation* . CFA Institute.

Thaler, Richard H. 2005.*Advances in Behavioral Finance* , Vol. II. Russell Sage Foundation, Princeton University Press.

Thauvron, Arnaud. 2013.*Evaluation d'entreprise* . 4th ed. Paris: Economica.

Walsh, Ciaran. 2008. *Key Management Ratios* , 4th ed. Financial Times Series. FT Prentice Hall. Pearson Education Limited.

## Webography

[www.alibabagroup.com](http://www.alibabagroup.com) (Investor Relations).

[www.amazon.com](http://www.amazon.com) (Investor Relations).

[www.nasdaq.com](http://www.nasdaq.com) (AMZN, BABA, WMT).  
[www.walmart.com](http://www.walmart.com) (Investor Relations).

## Balance Sheets

Alibaba Group, Fiscal Year 2019 Results (Year Ended March 31, 2019), May 15, 2019.

Amazon 2018 Report (Year Ended December 31, 2018), January 31, 2019.

Carrefour, 2018 Full Year Results, February 28, 2019.

Duke Energy 2018 Annual Report, Transforming the Future, Feb 14, 2019.

Fiat Chrysler Automobiles (FCA), Semi-Annual Report (Ended June 30, 2019), July 31, 2019.

General Motors, Second Quarter Earnings 2019, August 1, 2019.

Groupe EDF, 2019 Half Year Results, July 26, 2019.

National Grid, Annual Report and Accounts 2018/19 (Year Ended March 31, 2019), May 16, 2019.

Walmart, Defining the Future of Retail, 2019 Annual Report (Year Ended January 31, 2019), April 23, 2019.

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